INSTRUCTION MANUAL

FOR

WJ-8610A-1 CONTROLLER

WATKINS-JOHNSON COMPANY
700 Quince Orchard Road
Gaithersburg, Maryland 20878

April 1986

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WARNING

This equipment utilizes voltages which are potentially dangerous and may be fatal if contacted. Exercise extreme caution when working with the equipment with any protective cover removed.

EQUIPMENT MALFUNCTIONS

This unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. If an apparent malfunction is encountered after installation, verify that the correct input signals are present at the proper connectors. Prior to taking any corrective maintenance action or breaking any seals, contact your Watkins-Johnson representative, or the Watkins-Johnson Company Service Department to prevent the possibility of voiding the terms of the warranty. Contact the Watkins-Johnson Company via mail, telephone, wire, or cable at:

Watkins-Johnson Company
Company Service Department
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794

Toll Call: (301) 948-7550 Ex. 7201
TELEX: 89-8402
TWX: 710-828-0546
TELEFAX: (301) 921-9479
EASYLINK: 62928185

If reshipment is necessary, follow the instructions in the following paragraph (Preparation for Reshipment or Storage). Do not return the equipment until a Return for Maintenance Authorization (RMA) number has been obtained from the Watkins-Johnson Company's Customer Service Department. See Item 10 in the **General Terms and Conditions of Sale** paper (WJ Form # WJ-151-X) for more information on equipment returns.

PREPARATION FOR RESHIPMENT OR STORAGE

If the unit must be prepared for reshipment, the packaging method should follow the pattern established in the original shipment. Use the best packaging materials available to protect the unit during reshipment or storage. When possible, use the original packing container and cushioning materials. If the original packing materials are not available, use the following procedure:

1. Wrap the unit in sturdy paper or plastic.
2. Place the wrapped unit in a strong shipping container and place a layer of shock-absorbing material (3/4-inch minimum thickness) around all sides of the unit to provide a firm cushion and to prevent movement inside the container.

3. If shipping the unit for service, fill out all information on the 5x6 PRODUCT DISCREPANCY REPORT card (WJ Form # WJC-QA55-0) that was provided with the original shipment. Also ensure that the Return for Maintenance Authorization (RMA) number is recorded on the card. If this card is not available, attach a tag to the unit containing the following information:

    a. Return for Maintenance Authorization (RMA) number.
    b. The Watkins-Johnson Type/Model number of the equipment.
    c. Serial number.
    d. Date received.
    e. Date placed in service.
    f. Date of failure.
    g. Warranty adjustment requested, yes or no.
    h. A brief description of the discrepant conditions.
    i. Customer name and return address.
    j. Original Purchase Order/Contract number.

4. Thoroughly seal the shipping container and mark it **FRAGILE.**

5. Ship to:

    Watkins-Johnson Company
    700 Quince Orchard Road
    Gaithersburg, Maryland 20878-1794
    U.S.A

When storing the equipment for extended periods, follow the above packing instructions to prevent damage to the equipment. The safe limits for storage environment are:

Temperature: -40 to +70°C
Humidity: less than 95%

WJ-8610A-1 CONTROLLER
REVISION A CHANGE 1

TITLE:	INSTRUCTION MANUAL FOR THE WJ-8610A-1 CONTROLLER
MANUAL DATE:	April 1986
CHANGE 1 DATE:	August 1990
APPLICABILITY:	All units.
CHANGES/ERRATA INFORMATION:	Changes refer to updates to the manual to cover design modifications. Errata refer to corrections or clarifications of information in the manual.
CHANGE 1 SUMMARY:	This change updates the software to support WJ-8615P receivers.
CHANGE:	This new version of software supports the WJ-8615P receivers. The only function change is with scan execution from the controller. The controller uses memory channels 0 and 1 for WJ-8615D receivers. The use of the lowest memory channels in the WJ-8615P would likely interfere with receiver front panel memory operations, so memory channels 148 and 149 are used instead. This is only apparent by looking at the front panel of the receivers. The WJ-8615D will display "SCN 000", while the WJ-8615P will display "SCAN24 ..." if the front panel memory partition is at the default of 99. The scan channel number displayed will vary depending on this setting. However, the corresponding memory channel is always the same, 148 and 149. In other words, the controller executes scans to the lowest memory channels for WJ-8615D receivers and to the highest memory channels for WJ-8615P receivers. This minimizes the interference of controller operations with the receiver front panel operations.

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SECTION I

GENERAL DESCRIPTION

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

The WJ-8610A-1 Controller is designed to function as part of the multiple receiver system, controlling up to fourteen WJ-861X Receivers. It can be controlled remotely by a system computer or locally by its front panel controls. In addition to maintaining control over the standard receiver capabilities, the controller provides extended control features, which permit a local operator to direct operations such as Spectrum Scanning, Frequency Stepping, Automatic Hand-Off and the development of spectrum traces on an external XYZ display when WJ-8615 Receivers equipped with the Step-Scan-Lockout are installed in the first four receiver stations.

Interconnection between the controller/extender and the system computer is via an IEEE-488 standard interface (1978 IEEE-488 Standard), with a second IEEE-488 interface interconnecting the controller with up to fourteen WJ-861X Receivers. During the manual operating mode, all of the receiver functions are controlled by the WJ-8610A-1 Controller front panel controls. The operating parameters are selected by pressing the appropriate dedicated control buttons. When pressed, an illuminated LED on that button indicates the selection. A series of nine keypad control keys are found above the sixteen button keypad to enable different keypad functions.

A CRT display is provided to detail receiver parameters and operating characteristics. Located to the right of the CRT display are five "softkeys" for video display operation, as defined in **paragraph 2.3.3**. The "softkeys" have a number of functions, which are dependent on the particular CRT display and/or a previously pressed softkey.

In addition to the CRT display, LEDs produce digital and alphanumeric displays to provide information on the system parameters, COR, Memory Location, BFO Frequency, Menu Mode and other operations selected by the front panel or a remote location. Each receiver (up to fourteen) may be controlled individually from the front panel. A particular setup of each receiver may be stored in Controller memory and relayed to another receiver if and when desired. A pushbutton switch is used for the power ON/OFF switch, which also contains an indicator lamp that is illuminated when the power is switched ON.

The WJ-8610A-1 Controller may also be used in conjunction with an external computer, through its IEEE-488 internal bus interface. In the Remote Control mode, the WJ-8610A-1 Controller can operate as a "bus extender" and command distribution point. A second external interface provides the capability of controlling the receivers. The external computer can communicate with any of the fourteen receivers through the Controller, by using it to transfer control data, or to provide a path to communicate. The Pass-Through Commands permit the remote computer to bypass the WJ-8610A-1 Controller and function strictly as an extender to relay information directly to any of the receivers designated as "pthr" (pass-through) receivers. In addition, the Controller acts as an "extender" in this mode, loading the computer with the equivalent load of only ONE device, while fourteen (14) receivers are actually being controlled through the Controller. In this way, 196 receivers can be controlled by the external computer over a single bus, (using fourteen WJ-8610A-1 Controllers).

Ease of maintenance and flexibility is provided by the modular design concept. Nearly all functional modules plug directly into the motherboards and the connections are accessible from the top of the controller, with the top panel removed.

CAUTION

With the protective cover removed, exercise extreme caution when working in the CRT Compartment due to the high voltage (30,000 Volts) applied to the flyback transformer.

1.2 MECHANICAL CHARACTERISTICS

The WJ-8610A-1 Controller is designed to mount in a standard 19 inch (48.3 cm) equipment rack. The overall controller length is 23.28 inches (59.1 cm), as measured from the front handles to the rear handles. The unit extends 21.3 inches (54.1 cm) into the rack to the tips of the rear protective handles. The controller occupies 5.25 inches (13.3 cm) of vertical space. The controller main chassis, compartment dividers, module bucket, top cover, front and rear panels are all made of aluminum.

All operating controls are mounted to the front panel or extend through cutouts in the bezel. The bezel is black anodized aluminum, with the control markings etched above the cutouts. The digital display is mounted to the back of the front panel and is visible through the display window. The controls for the controller and the CRT are located on the front panel. All connectors, with the exception of the phones jack, are located on the rear panel. These connectors consist of: 6 BNC type connectors, 4 multipin D type connectors, 2 IEEE-488 multipin connectors, 1 RS-232 multipin connector and the line voltage input connector. The cooling fan, the line voltage selector switch (S2) and the ground lug are also located on the rear panel.

The top protective cover is secured via quarter turn fasteners. Removing the top cover allows access to the four different controller sections, the power supply and associated components, the CRT unit (video display), the control/display section and the front panel board and interfacing. The CRT section is mounted to the main chassis via four screws. The control/display section is contained in a bucket assembly. This bucket assembly is secured to the bottom of the main chassis via two spring loaded screws. Unscrewing the two screws allows the bucket assembly to be raised, from the left side, providing access to the subassemblies contained within the bucket. Raising the left side of the bucket assembly and unscrewing two screws on the center compartment divider releases a hinged metal support bracket. Moving the top of the support bracket away from the compartment divider provides a convenient support for the control/display bucket to be rested on. This support allows the printed circuit boards contained in the bucket to be accessed and allows the boards to be extended while the controller is on.

Compartment structure is used for isolation between the sections of the controller and for structural support of the unit.

1.3 EQUIPMENT SUPPLIED

The equipment supplied consists of the WJ-8610A-1, an AC power cord and an extender card, mounted in one of the vacant slots of the digital control bucket.

1.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED

To obtain full use of the WJ-8610A-1 Controller, equipment from the following list should be selected:

1) From 1 to 14 WJ-861X Receivers. A minimum of one receiver is required.

2) Receiver interconnecting cables

3) Audio monitoring equipment

   - Speaker panel (600 ohms)
   - Headphone Set (600 ohms)
   - Tape Recorder

4) HP-85 or other suitable controller, equipped with an IEEE-488 Standard Interface (1978 IEEE-488 Standard)

Table 1-1. WJ-8610A-1 Controller Specifications

Receivers Controlled (Directly)	1 to 14 receivers
Receivers Controlled (As an Extender)	1 to 196 receivers*
Bus Interfaces (and Rear Panel Connectors):**	
Receiver Bus Interface	IEEE-488
Computer Bus Interface	IEEE-488
System Cable Length	2 Meters times the number of devices or 20 Meters, whichever is less.
Temperature Range:	
Operating	0°C to 50°C
Storage	-20°C to 80°C
Power Requirements:	
110 Vac Range	95 to 130 Vac
220 Vac Range	210 to 250 Vac
Frequency Range	47 to 63 Hz ***
Power Consumption	60 Watts maximum
Dimensions:	
Width	19 inches (48.3 cm)
Height	5.25 inches (13.3 cm)
Depth (to the rear protective handles)	21.3 inches (54.1 cm)
Weight	35 pounds

* One computer bus, 14 Controllers for 196 receivers.

** The RS-232 marked connector on the rear panel is NOT presently operator usable.

*** Consult factory for 400 Hz operation.

SECTION II

INSTALLATION AND OPERATION

SECTION II

INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTION

Examine the shipping carton for damage before unpacking the equipment. If the carton exterior appears to be damaged, attempt to have the carrier's agent present during the unpacking of the equipment. If this is not possible, and if equipment damage is evident, retain all packing material and shipping containers for the carrier's inspection. Also, verify that the equipment supplied is as listed on the packing slip. Contact the Watkins-Johnson Company or your Watkins-Johnson representative with details of any discrepancy or shortage.

2.2 INSTALLATION

The WJ-8610A-1 Controller is designed for mounting in a standard 19-inch (48.3 cm) equipment frame. It occupies 5.25 inches (13.3 cm) of vertical rack space and extends approximately 21.3 inches (54.1 cm) into the rack, to the tips of the rear protective handles. Do not rely soley on front panel mounting for support of the unit in the rack. The use of equipment slides, mounted to the side panels of the unit, is recommended for proper support and acceptance mounting holes are provided. The rack should allow for free air flow and cable access at the rear panel of the unit.

Prior to installing the WJ-8610A-1 Controller, verify that the controller is properly configured for its intended application. Verify that the voltage selector switch (S2) on the rear panel is set to accommodate the available line voltage at the installation site. The 110 V position will support line voltages ranging from 95 to 130 Vac. In the 220 V position, line voltages ranging from 210 to 250 Vac are supported. In either position, the power line frequency may range from 47 to 63 Hz.

Installations that utilize control by an external computer may require that the address of the controller on the Remote Control Bus (J2) be changed to accommodate the external system. The remote address of the controller is factory set to address 00 by a DIP switch on the IEEE-488 Interface subassembly (A4A4). This address may be reset to any value, ranging from 00 to 30, from the front panel as described in **paragraph 2.3.3.7** (Controller Parameter Display) or by setting switch positions 1 through 5 on the A4A4 subassembly, inside the controller. The setting of the DIP switch is the controller default address and is therefore the recommended means of selecting the controller remote address if the change is intended to be permanent. If the controller is reset, or if its random access memory is corrupted, the remote address will revert to the setting of the switch, regardless of what address has been set at the front panel. Refer to **Table 2-1** as a guide for address selection.

Table 2-1. WJ-8610A-1 Switch Configurations

IEEE-488 INTERFACE (A4A4)

1	2	3	4	5	*6	*7	*8	Bus Addr
on	on	on	on	on	on	off	on	00
off	on	on	on	on	on	off	on	01
on	off	on	on	on	on	off	on	02
off	off	on	on	on	on	off	on	03
on	on	off	on	on	on	off	on	04
off	on	off	on	on	on	off	on	05
on	off	off	on	on	on	off	on	06
off	off	off	on	on	on	off	on	07
on	on	on	off	on	on	off	on	08
off	on	on	off	on	on	off	on	09
on	off	on	off	on	on	off	on	10
off	off	on	off	on	on	off	on	11
on	on	off	off	on	on	off	on	12
off	on	off	off	on	on	off	on	13
on	off	off	off	on	on	off	on	14
off	off	off	off	on	on	off	on	15
on	on	on	on	off	on	off	on	16
off	on	on	on	off	on	off	on	17
on	off	on	on	off	on	off	on	18
off	off	on	on	off	on	off	on	19
on	on	off	on	off	on	off	on	20
off	on	off	on	off	on	off	on	21
on	off	off	on	off	on	off	on	22
off	off	off	on	off	on	off	on	23
on	on	on	off	off	on	off	on	24
off	on	on	off	off	on	off	on	25
on	off	on	off	off	on	off	on	26
off	off	on	off	off	on	off	on	27
on	on	off	off	off	on	off	on	28
off	on	off	off	off	on	off	on	29
on	off	off	off	off	on	off	on	30

* Must remain at factory setting

Table 2-1. WJ-8610A-1 Switch Configurations (Cont'd)

7911/RP64 16k RAM (A4A6)

SW1 Positions *

1	2	3	4	5	6
off	off	on	on	off	off

SW2 Positions *

1	2	3	4	5	6
off	off	on	on	off	off

CRC/Real Time Clock (A4A7)

SW1 Positions *

1	2	3	4
off	on	on	off

* Must remain at factory settings

CAUTION

Only switch positions 1 through 5 on the A4A4 subassembly are user selectable. All other switches within the unit must remain in their original factory settings. The appropriate settings are provided as a reference in **Table 2-1.**

Once properly configured, the WJ-8610A-1 Controller may be installed. Each receiver in the system must be set to a different bus address, in the range from 0 to 25. It should be noted that upon system initialization, the controller will assign receiver stations in address order. It is therefore recommended that a logical ascending address sequence be assigned to reflect the desired receiver station assignments. Only the first four receiver stations will accommodate display type receivers. These receivers must therefore have the four lowest addresses to assure that they will occupy stations 1 through 4. Refer to the appropriate receiver manual for details on receiver address selection.

The Table of Connectors (**Table 2-2**) has been provided as a reference for system interconnection. For greater detail regarding any of the connector signals, refer to **paragraph 2.2.1.**

2.2.1 CONNECTOR SIGNALS

2.2.1.1 AC IN F1 — The power input connector provides the ac power input to the controller and also houses the power fuse. It will support line voltages ranging from 95 to 130 Vac or 210 to 230 Vac, as determined by the setting of the line voltage selector switch (S2).

To access the line fuse for the controller, remove the power cord from the F1 socket. Place the tip of a small screwdriver into the slot along the inside upper edge of the socket and gently pry the fuse housing loose. The fuse and fuse housing will release from the socket, allowing access to the 1 ampere line fuse.

Table 2-2. Table of Connectors

Connector	Type	Function
F1 AC IN	---	Power input and line fuse holder
J1 RCVR CONT	IEEE-488	Receiver Control port
J2 RMT CONT	IEEE-488	Remote Control port
J3 RS-232 PORT	RS-232	Serial Data port (additional software required)
J4 VIDEO OUT	BNC	Composite Video from controller CRT
J5 AUDIO IN	BNC	Audio input from receivers
J6 AUDIO OUT	BNC	Buffered audio output
J8 X OUT	BNC	Horizontal output to XYZ display
J9 Y OUT	BNC	Vertical output to XYZ display
J10 Z OUT	BNC	Intensity control to XYZ display
J11 RECEIVER 1	9 PIN D	Video and sync from receiver 1
J12 RECEIVER 2	9 PIN D	Video and sync from receiver 2
J13 RECEIVER 3	9 PIN D	Video and sync from receiver 3
J14 RECEIVER 4	9 PIN D	Video and sync from receiver 4

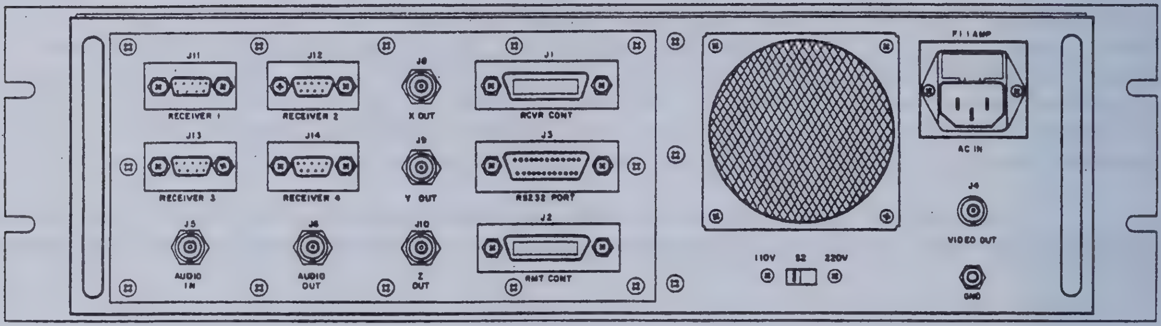

J11
RECEIVER 1
J12
RECEIVER 2
J8
X OUT
J1
RCVR CONT
J13
RECEIVER 3
J14
RECEIVER 4
J9
Y OUT
J3
RS232 PORT
J5
AUDIO IN
J6
AUDIO OUT
J10
Z OUT
J2
RMT CONT
F1 1 AMP
AC IN
J4
VIDEO OUT
110V
S2
220V
GND

Figure 2-1. WJ-8610A-1 Rear Panel Connections

2.2.1.2 **RCVR CONT J1** — This IEEE-488 type multipin connector provides the control interfacing between the WJ-8610A-1 Controller and the system receivers. The installation of the interface cables at this connector must comply with the specifications set forth by the IEEE-488-1978 Standard, as deviation from this standard could cause unreliable bus operation. As stated in the standard, no more than fifteen devices (the controller plus up to fourteen system receivers) may connect to the interface. The interface will support a maximum cable length of 20 meters, or two meters times the number of devices on the bus, whichever is less. Also, it is recommended that no more than 4 meters exists between any two devices. The interface connections may be installed in a STAR or DAISY CHAIN configuration, or any combination of these configurations.

2.2.1.3 **RMT CONT J2** — The Remote Control connection is provided to interface the WJ-8610A-1 Controller with an external system computer, for remote computer control. As with the Receiver Control (J1), this connection complies with the IEEE-488-1978 Standard and the same precautions should be observed when connecting to this point (see **paragraph 2.2.1.2**).

2.2.1.4 **RS-232 PORT J3** — The RS-232 Port is available at the rear panel to provide a serial data link. Although electrically connected, this port is not supported by the standard controller. Additional software must be installed to utilize this type of data transfer.

2.2.1.5 **Video Out J4** — This BNC type connection provides a composite video output that is a duplicate of the CRT display at the controller front panel. The output impedance is 75 ohms and the output signal is similar to that specified by the RS-170 standard.

2.2.1.6 **Audio In J5** — The Audio In connector is intended to interface with the audio output circuits of WJ-8615 Receivers that are equipped with the Selected Audio Output option. It provides a 600 ohm input impedance and uses a BNC type connector.

2.2.1.7 **Audio Out J6** — The Audio Out connector provides a 600 ohm audio output to drive an external speaker panel. The signal at this BNC type connector is the same audio that is present at J5, after being buffered by the controller.

2.2.1.8 **X OUT J8** — This BNC connector provides the X axis voltage to drive an external XYZ display. The voltage range at this output is approximately 1 V p/p when loaded into 150 ohms. This output has been factory set to drive a CRT with a 1 V full scale deflection.

2.2.1.9 **Y OUT J9** — The Y Output connector provides the Y axis voltage to drive an external XYZ display. The level at this BNC output is approximately 1 V p/p when loaded into 150 ohms. This output has been factory set to drive a CRT with a 1 V full scale deflection.

2.2.1.10 **Z OUT J10** — This BNC connector provides the Z axis voltage to drive an external XYZ display. The level at this output is approximately 1 V p/p when loaded into 150 ohms. This output has been factory set to drive a CRT with a 1 V full scale deflection.

2.2.1.11 **Receiver 1 J11** — The Receiver 1 connector receives log video and sync information from receiver station 1 when a WJ-8615 Receiver equipped with Step-Scan-Lockout (SSL) capabilities is installed at that station. This 9 pin D connector receives log video and sync information from J13 on the SSL receiver and uses this data to develop the trace signals that are provided to the external XYZ display. These signals at J11 are provided during the time that the receiver is in a scan mode.

2.2.1.12 **Receiver 2 J12** — The Receiver 2 connector is identical to that of the Receiver 1 input described in **paragraph 2.2.1.11,** except that it receives its log video and sync signals from the receiver installed at receiver station 2.

2.2.1.13 **Receiver 3 J13** — The Receiver 3 connector functions in the same manner as connectors J11 and J12, except that its inputs are provided by connector J13 of the SSL receiver installed at receiver station 3.

2.2.1.14 **Receiver 4 J14** — This video and sync input functions in exactly the same manner as the previously described receiver inputs, except that the input is provided by the SSL receiver installed at receiver station 4.

2.3 LOCAL OPERATION

The WJ-8610A-1 Controller utilizes a group of dedicated front panel controls and indicators to provide full control over the operation of up to fourteen receivers connected to its receiver control bus. In addition to maintaining control over the standard receiver capabilities, the controller provides extended control features which permit a local operator to direct operations such as Spectrum Scanning, Frequency Stepping, Automatic Hand off and the development of spectrum traces on an external XYZ display, when WJ-8615 Receivers equipped with the Step-Scan-Lockout are installed in the first four receiver stations. The front panel CRT display and five display related softkeys provide the operator with a selection of data tables which permit all fourteen receiver stations to be simultaneously monitored, or more detailed displays may be selected for a specific receiver, permitting detailed analysis of signal activity. These displays also provide an extension of the operational control of the receivers. Display related features are described in detail in **paragraph 2.3.3.**

In addition to exercising all of the capabilities that are associated with the system receivers, a ninety-nine channel parameter memory and a thirty channel scan memory extend the operational capabilities of the system. The controller's ninety-nine channel parameter memory stores complete receiver set ups and permits operator access at any time to retrieve the data and direct it to any receiver in the system. Using this feature, important set ups may be stored for future use and may be rapidly recalled and directed to any receiver in the system when needed. In addition, the thirty channel scan memory, contained in the controller, stores frequently used scan parameters, permitting commonly used scan set ups to be rapidly recalled and directed to a selected receiver for execution (see **paragraph 2.3.3.4,** Selected Scan Display).

A buffer receiver, designated as receiver station X0, is provided to aid in parameter set ups, without affecting the operation of any of the system receivers. This is not an actual receiver, but is a section of controller memory which is set aside to respond to and store front panel control settings. When this receiver station is called up to the front panel, the controls and displays respond as if an actual receiver is being controlled but the control operations have no affect on the stations containing operational receivers. It is useful in creating set ups to be handed off to actual receivers and in performing memory programming and recall operations without interfering with the operation of any of the receivers in the system.

Two types of scan operations are available to receivers installed in a WJ-8610A-1 system. The primary type of scan operation is controlled by the Selected Scan Display, described in **paragraph 2.3.3.4.** This type of scan operation utilizes the controller's thirty channel scan memory to rapidly pass preprogrammed scan parameters to any selected receiver for execution. From the Selected Scan Display, three distinct scanning modes are available, depending on the nature of the search being performed. Details pertaining to Selected Scan Display initiated operations are provided in **paragraph 2.3.3.4.**

The second type of scan operation, which is executed from the Selected Receiver Display (as described in **paragraph 2.3.3.2**), is associated with the individual receivers. From this display, the programming of the scan parameters and lockout frequencies into the receiver's memory is performed, and the actual scan operation is controlled. This display also controls all of the functions required to execute discrete frequency step operations. When the system is equipped with an external XYZ monitor to display traces of the signal activity encountered by the scanning receiver, it is not recommended that the scan be initiated from the Selected Receiver Display. Only scans initiated from the Selected Scan Display will produce valid traces.

2.3.1 WJ-8610A-1 CONTROLLER INITIALIZATION

The procedure that follows provides the initial power up sequence to be used when the WJ-8610A-1 Controller is installed in a receiving system for the first time, or when major changes have been made to the configuration of the receivers on the receiver control bus. It is assumed that all of the system components have been installed at this time and all equipment on the receiver control bus is in the off position. It is recommended that the information pertaining to the Controller Parameter Display (**paragraph 2.3.3.7**) and the Selected Receiver Display (**paragraph 2.3.3.2**) be reviewed prior to initialization of the controller.

1. Be sure that all receiver addresses have been set to the desired address, as the initialization sequence will assign receiver stations in ascending order according to address. Refer to the appropriate receiver manual for details on receiver address selection.

2. With all of the receivers turned off, press and hold the **TUNE DISAB** button on the WJ-8610A-1 Controller and apply power to the controller. When the **VERSION** display is in the digital display window, release the **TUNE DISAB** button. This process will clear the controller memory and place the controller into its initial setting, as follows:

RCVR	X0 selected	COR	0
MEM/HND/BW Hz	1k	ANT	1
RCVR/TRACE LED	ON	FREQ	20.0000M
BW1 LED	ON	TUNE DISAB..............	ON
AM LED..................	ON	CRT DISPLAY	CONTOLLER PARAMETER TABLE
AGC LED	ON		

3. Press button K5 **(MORE KEYS)** one time to select the proper softkey menu along the right side of the CRT.

4. Press button K2 **(CONTROLLER PARAM.)** to display **FIND AND LEARN RCVRS** adjacent to the K3 button.

5. Apply power to all of the receivers on the bus.

6. Now, press K3 **(FIND AND LEARN RCVRS).** This will cause the controller to find each receiver on the receiver bus, assign a receiver station to each unit, and query each station to learn its configuration (i.e. Bandwidths, options).

7. Initialization of system is now completed.

2.3.2 CONTROLS AND INDICATORS

Table 2-3 has been provided as a reference for the detailed control and indicator descriptions that follow. Also, refer to the WJ-8610A-1 Controller Front Panel illustration **(Figure 2-2)** as a guide for identification of each item.

2.3.2.1 **Power** — The POWER control applies power to the WJ-8610A-1 Controller and to the CRT display. When placed into the ON position, the button will remain partially depressed and the button will illuminate indicating that power is on. Pressing this button a second time will place the button into its fully extended OFF position and its indicator light will extinguish.

2.3.2.2 **CRT Intensity** — The CRT Intensity control permits the brightness of the CRT display to be adjusted for a comfortable viewing level under different ambient lighting conditions.

2.3.2.3 **Display Intensity** — The Display Intensity adjustment permits the adjustment of the digital display and pushbutton LEDs to a comfortable viewing level under different ambient lighting conditions. Adjustment of this control is performed using a small straight bladed screwdriver.

2.3.2.4 **Audio Gain** — The Audio Gain control provides the operator with control over the level of the audio signal present at the front panel PHONE jack. Adjustment of this control will have no affect on the audio level at the rear panel audio connector.

2.3.2.5 **TUNE DISAB** — The Tune Disable button is used to activate or disable the tuning wheel during normal controller operation. As a secondary function, during controller power up, the TUNE DISAB button will provide a memory clear function. To activate this function, hold the TUNE DISAB button in while powering the controller on. When the software version appears on the digital display, release the button. This action will clear all random access memory in the controller and cause the Find And Learn function to be triggered after setting the controller to the following preset condition:

RCVR	X0 selected
MEM/HND/BW Hz	1k
RCVR/TRACE LED	ON
BW1 LED	ON
AM LED	ON
AGC LED	ON
COR	0
ANT	1
FREQ	20.0000 M
TUNE DISAB	ON
CRT DISPLAY	CONTROLLER PARAMETER TABLE

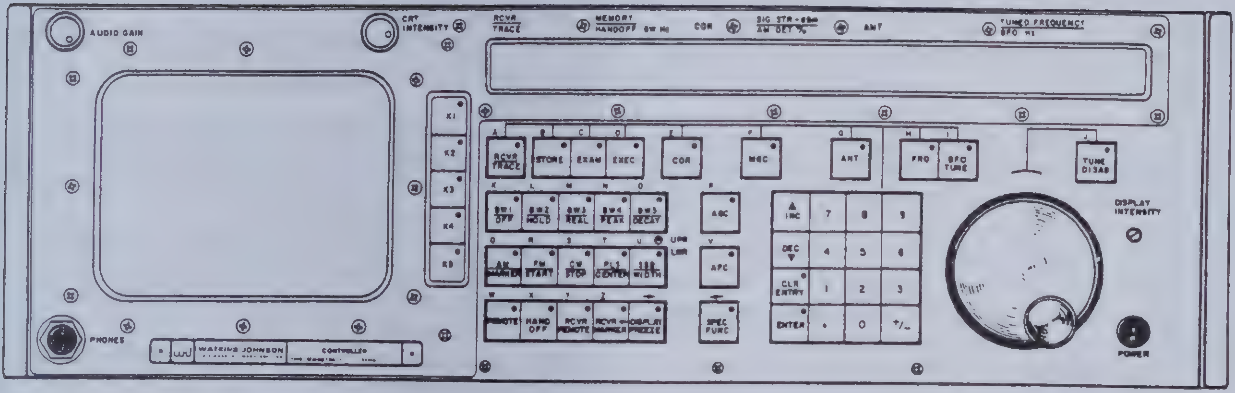

AUDIO GAIN
CRT INTENSITY
RCVR TRACE
MEMORY HANDOFF
BW Hz
COR
SIG STR - dBm
AM DET %
ANT
TUNED FREQUENCY
BFO Hz
K1
K2
K3
K4
K5
A
B
C
D
E
F
G
H
I
J
RCVR TRACE
STORE
EXAM
EXEC
COR
MGC
ANT
FRQ
BFO TUNE
TUNE DISAB
K
L
M
N
O
P
BW1 OFF
BW2 HOLD
BW3 REAL
BW4 PEAK
BW5 DECAY
AGC
Q
R
S
T
U
V
UPR
LWR
AM
FM START
CW STOP
PLS CENTER
WIDTH
AFC
W
X
Y
Z
REMOTE
HAND OFF
RCVR REMOTE
RCVR
DISPLAY FREEZE
SPEC FUNC
INC
7
8
9
DEC
4
5
6
CLR ENTRY
1
2
3
ENTER
.
0
+/-
DISPLAY INTENSITY
POWER
PHONES
WATKINS JOHNSON
CONTROLLER

Figure 2-2. WJ-8610A-1 Controller Front Panel

Table 2-3. WJ-8610A-1 Table of Controls and Indicators

CONTROL/INDICATOR	DESCRIPTION
Power	Push ON/OFF AC power switch.
Display Intensity	Digital display and LED intensity control.
CRT Intensity	CRT brightness control.
Audio Gain	Level control for phone audio.
Tuning Wheel	Tuned Frequency or BFO offset frequency control.
Tune Disab	Disables (LED on) and Enables (LED off) the tuning wheel operation.
Keypad	Provides direct entry of data as determined by the keypad control buttons.
Keypad Control Buttons	Determine the Keypad control function.
Rcvr/Trace	Places the front panel of the controller into either the trace or receiver control mode. In the receiver mode, this control directs keypad control to receiver selection. While in receiver control, the black labeling on the keys is active. In the trace mode, this control directs keypad control to the trace selection on an external XYZ monitor. While in trace control, the red labeling on the keys is active.
Store/Exam/Exec	Directs keypad to control memory selection to store, examine or execute WJ-8610A-1 memory functions.
COR	Places the Carrier-Operated-Relay function of the selected receiver under keypad control.
MGC	Places the Manual Gain Control of the selected receiver under keypad control.
ANT	Provides keypad control of antenna selection (not presently utilized).
FRQ	Provides keypad control of tuned frequency for the selected receiver.
BFO Tune	Provides keypad control of BFO frequency for the selected receiver.
AGC	Places the selected receiver into the automatic (LED on) or manual (LED off) gain control mode.
AFC	Activates (LED on) or Disables (LED off) the selected receiver's Automatic Frequency Control.
Spec Func	(not presently utilized)
BW1-BW5	When the controller front panel is in the receiver control mode, this group of buttons select the IF bandwidth of the selected receiver, as indicated by the designation etched in black on the button face.

Table 2-3. **WJ-8610A-1 Table of Controls and Indicators** (Cont'd)

CONTROL/INDICATOR	DESCRIPTION
	In the trace control mode, these buttons perform the trace related functions indicated in red on the button face, as follows:
BW1/OFF	Blanks the selected trace from the face of the external monitor.
BW2/HOLD	Halts the updating of the selected trace and holds the signal data obtained during the last scan.
BW3/REAL	Provides a continuous update of the spectrum trace to display a real-time trace of signal activity in selected frequency spectrum.
BW4/PEAK	Collects and holds the peak amplitude of all signal activity that has occurred within the frequency range of the displayed trace.
BW5/DECAY	Selects the decay mode, in which lost signal activity slowly decays from the trace.
AM/FM/CW/PLS/SSB	When in the receiver control mode, this group of buttons selects the detection mode of the selected receiver, as indicated by the designations etched in black on the button face. When the front panel is in the trace control mode, these buttons perform the functions that are designated by the red etchings on the button face, as follows:
AM/MARKER	Directs the controller frequency control to the positioning of an intensified marker on the selected trace of the external monitor.
FM/START	Directs the frequency control to the setting of the start frequency of the selected trace.
CW/STOP	Directs the frequency control to the setting of the stop frequency of the selected trace.
PLS/CENTER	Directs the frequency control to the control of the center frequency of the selected trace.
SSB/WIDTH	Directs the frequency control to the control of the spectrum width of the selected trace.
UPR/LWR (indicator only)	Functions with the SSB button to indicate if Upper Sideband, Lower Sideband or both (ISB) are active.
Remote	Switches the WJ-8610A-1 Controller between REMOTE (LED on) and LOCAL (LED off) mode of operation.

Table 2-3. **WJ-8610A-1 Table of Controls and Indicators** (Cont'd)

CONTROL/INDICATOR	DESCRIPTION
Handoff	Activates a handoff of parameters to another receiver.
Rcvr Remote	Places the selected receiver into REMOTE (LED on) or LOCAL (LED off) mode of operation.
Rcvr→Marker	Causes the intensified marker of the selected trace to track the frequency of the selected receiver.
Display Freeze	Halts the updating of all of the traces on the external monitor and holds the trace data that was present when freeze was selected.
K1-K5	Key functions of the softkeys are determined by the CRT display present.

2.3.2.6 **Tuning Wheel** — The Tuning Wheel provides control over the selected receiver's frequency or BFO. When the LED on the BFO pushbutton is illuminated, the Tuning Wheel will select the BFO offset frequency and the offset will be present in the frequency display window. If the BFO LED is not illuminated, the tuned frequency of the selected receiver is controlled. The tuning resolution in either case is determined by the flashing cursor in the display window. Tuning via the Tuning Wheel may only be performed when the TUNE DISAB button LED is off. While in the trace control mode, the Tuning Wheel will control the trace frequency parameter indicated on the LED display strip to the left of the frequency.

2.3.2.7 **Keypad** — This 16-button pad is a multi-functioned control, whose control function is determined by the keypad control buttons described in **paragraph 2.3.2.8.** The keypad provides the capability of direct entry of values or entries may be incremented or decremented, using the appropriate buttons.

0-9: Buttons 0-9 provide direct entry of the numerical value printed on the face of each button. When using the direct entry mode, the last digit must be followed by the ENTER key to complete the entry.

"." (decimal): The decimal key permits the entry of fractional values when in the direct entry mode.

+/-: The +/- key is used for direct entry of BFO offsets to select positive or negative offsets.

CLR ENTRY: The Clear Entry key provides a means of editing direct entries without affecting the original selection. When pressed, the entry is cancelled and the original value is retained. This key is only active when illuminated.

ENTER: The Enter button completes a direct entry and updates the selected parameter to the new value. This key is only active when illuminated.

INC: The Increment button permits a selected parameter to be increased from its original value. When this button is used, the update is immediate. The ENTER key is not needed.

When the keypad is assigned to tuning by the BFO or FRQ keypad control buttons, the INC button will move the tuning resolution cursor in the digital display to the left to increase the tuning step size.

DEC: The Decrement button permits a selected parameter to be decreased from its original value. When used, this button provides an immediate update without the use of the ENTER button.

When the keypad is assigned to tuning by the BFO or FRQ keypad control buttons, the DEC button will move the tuning resolution cursor in the digital display to the right to decrease the tuning step size.

2.3.2.8 **Keypad Control** — The row of pushbuttons directly below the digital display control the operational assignment of the front panel keypad. Each of these buttons are electrically interlocked to permit only one function to be assigned at any given time. Pressing any button in the row assigns the control function etched on the face of that button to the keypad and illuminates the LED on the button to indicate the active keypad function. Any previously selected control function is disabled and the associated button LED is extinguished. The Keypad control buttons and their function are as follows:

RCVR/TRACE — The Receiver/Trace button is a dual functioned control used to assign the keypad to either Trace or Receiver selection. With each press of this button, the destination of keypad control is toggled between receiver selection and trace selection. Directly above this button, the RCVR/TRACE display indicates which mode the keypad is in and the present selection for that mode. When in the receiver selection mode, the display will show a value ranging from X0 to 14 to indicate which receiver station is under active control. Once the receiver selection has been made, all front panel operations will be directed to the selected receiver. In the trace selection, the RCVR/TRACE display will show a value ranging from T1 to T6 to indicate which trace is selected for control. When in the trace mode, this selection also places the Controller front panel into the trace control mode. In the trace control mode, many of the front panel control keys perform trace related functions, as indicated by the designations etched in red on the key face. This function will be described in greater detail in **paragraph 2.3.3.5.**

In either the receiver or trace mode, keypad entries may be made using the INC/DEC buttons or direct entries may be performed using the numerical buttons. In either case, the controller will not accept entries that are out of range.

STORE — The store button is used to place the keypad into the memory storage mode. Once the desired parameters have been set on the front panel, the store button is pressed to select the intended storage channel. The MEMORY/HANDOFF BW Hz display above this control will display a value in a range from ME 1 to ME 99, to indicate the memory channel selected for entry. At the keypad, channel selection may be performed by using the INC/DEC or numerical keys. Actual storage of the data will not occur until the ENTER button is pressed.

EXAM — The examine button permits access to any memory channel for review of the stored information. After this button is pressed, the keypad may be used to step up or down through the channels (using INC or DEC) or a desired channel may be entered directly. The contents of the channel will appear on the front panel, but will have no affect on the selected receiver operation.

EXEC — The execute button permits parameters stored at any memory location to be retrieved and directed to the receiver under active control. When in this mode, the desired memory channel is entered at the keypad and is executed when the ENTER button is pressed. If the memory location of the desired data is not known, the memory channels may first be reviewed in the examine mode. The controller will permit direct entry into the EXEC mode from EXAM.

COR — The COR button places the Carrier-Operated-Relay setting under keyboard control. In this mode, the COR threshold of the receiver may be set to within the range of the receiver that is under active front panel control. Above this control, the COR display indicates the selected setting. Signals at the receiver that exceed the programmed COR threshold level will cause an asterisk (*) to be placed adjacent to the value in the COR display to indicate the signal presence. Entry of any value greater than the range permitted by the receiver will cause the word OFF to be displayed, indicating that the COR circuit will remain inactive regardless of the strength of the incoming signal.

MGC — The Manual Gain Control button permits the local operator to enter an RF/IF gain setting which will set the receiver gain whenever the AGC mode is not active. Gain settings ranging from 0 to 255 are permitted, with 0 indicating minimum gain and 255 indicating maximum gain. Whenever the MGC button LED is illuminated, the SIG STR-dBm/AM DET % display directly above this button will indicate the last selected MGC setting. Otherwise, the display will show the signal strength (AGC on) or % of AM detector utilization (AGC off).

ANT — The antenna button permits the keypad to be used for selection of an antenna number. This number is for operator reference purposes only and is displayed above the button. (Function not presently utilized).

FRQ — The Frequency button directs keypad control to the selection of tuned frequency, or external monitor related frequency parameters. When in this mode, the numerical keys and the decimal point may be used for direct entry of the selected frequency parameter. The desired frequency (in MHz) is entered, followed by ENTER to complete the entry.

The INC and DEC keys function somewhat differently in this mode. These keys are used in conjunction with the tuning wheel to determine the tuning resolution. The INC button moves the flashing cursor in the frequency display to the left, causing larger frequency steps to be taken as the tuning wheel is rotated. The DEC button causes the tuning resolution cursor to move to the right, thus, increasing tuning resolution by decreasing the step size.

BFO TUNE — The BFO TUNE button performs a dual function. It places BFO tuning under keypad control and also directs tuning wheel operation to this function. In this mode, the keypad is used for direct entry of BFO offset frequencies, with the +/- key used to specify positive or negative offsets. The offset may also be entered using the tuning wheel. During the BFO TUNE mode, the frequency display above the tuning wheel will display the BFO frequency selection. The characters "BFO" will precede the digits to distinguish this mode from the normal tuning mode. As soon as a keypad control button other than BFO TUNE is selected, the display will revert back to the normal frequency display.

As in the FRQ mode, the INC and DEC buttons will determine the tuning resolution of the tuning wheel. Pressing BFO Tune, while in Examine, will cause the BFO frequency that is programmed into that memory channel to be displayed instead of the tuned frequency.

2.3.2.9 **IF Bandwidth Control/Trace Mode** — When the front panel is in the receiver control mode, control of the IF bandwidth of the selected receiver is provided by these five electrically interlocked Bandwidth buttons (labeled BW1 through BW5 in black on the face of the button). These buttons will reflect the currently active bandwidth of the selected receiver by illuminating the LED on the appropriate button. The button BW1 selects the number one bandwidth slot of the selected receiver, BW2 selects the number two bandwidth slot of the selected receiver, and BW3 through BW5 select the associated number bandwidth slot of the selected receiver. The actual value of the selected bandwidth in that receiver will be shown in the MEMORY/HANDOFF BW Hz window of the digital display. When in the trace control mode, each of these buttons control the display update mode of the selected trace. Use of the trace control functions of these buttons require that the system be equipped with an external monitor and the appropriate scanning receivers in one or more of the first four receiver stations. The display update mode that is activated will illuminate the LED on the selected button and also display the chosen mode in the title field of the selected trace on the external monitor.

When the controller front panel is in the trace control mode, these buttons perform a secondary function to provide trace related operations. In this mode, the buttons perform the functions etched in red on the button face as follows:

BW1/OFF — When the front panel of the controller is in the trace control mode, it will extinguish the selected spectrum trace on the external monitor. When turned off, only the trace will be extinguished, the label associated with the trace will remain on the monitor. The word "OFF" will be displayed in the display mode field to indicate that the off mode has been selected for that trace.

BW2/HOLD* — In the trace control mode, this button places the selected trace into the HOLD mode. In this mode, all updating of the selected trace will cease and the trace will hold all data obtained up to that point.

BW3/REAL — When in the trace control mode, this button places the selected trace into the REAL time mode. This trace mode provides a continuously updated trace, resulting from signal data obtained from each scan of the designated receiver.

BW4/PEAK* — When in the trace control mode, the BW4/PEAK button places the selected trace into the PEAK mode.

BW5/DECAY* — When in the trace control mode, the BW5/DECAY button places the selected trace into the DECAY mode. In this mode, the selected trace will temporarily retain the trace data for lost signals and cause the trace response for that signal to slowly decay from the trace. This mode is intended to simplify recognition of short duration signals.

* While in the Hold, Peak or Decay modes, any display changes will cause the previous display data to be dumped and new data to be updated with the most recent signal data for the spectrum.

2.3.2.10 **Detection Mode Control/Trace Control** — When the controller front panel is in the receiver control mode, the detection mode pushbuttons provide a selection of up to five detection modes and indicate the currently active detection mode of the selected receiver. These electrically interlocked buttons permit selection of: AM, FM, CW, PLS, and SSB detection (SSB option must be installed in the active receiver to activate the SSB mode). Selection of one of the buttons in this group will activate the appropriate detection in the selected receiver and illuminate the button LED to indicate the active mode. Any previous selection is disabled and the LED on that button is extinguished. The SSB button acts as a step function, switching between Upper Sideband, Lower Sideband, and Independent Sideband with each button press. When Lower Sideband is active, the LWR LED on the button is illuminated. Selection of Upper Sideband illuminates the UPR LED directly above the button. Both LEDs on indicate Independent Sideband (ISB).

When the controller front panel is in the trace control mode, these buttons perform a secondary function to provide trace related operations. In this mode, the buttons perform the functions etched in red on the button face, as follows:

AM/MARKER — In the trace control mode of the controller front panel, this button provides control over the placement of an intensified marker on the selected trace. When this function is selected, the word "MARKER", followed by the frequency position of the marker is displayed on the controller frequency display. Rotation of the tuning wheel positions the marker at the desired location on the selected trace. By pressing the FRQ key when in this mode, movement of the marker may be placed under keypad control.

FM/START — The START function permits the frequency spectrum of the trace to be varied by changing the frequency point at which the trace begins. Changing this parameter will not affect the scan parameters of the scanning receiver, only the portion of the scan that is displayed on the trace. When this function is selected, the word "START", followed by the start frequency of the trace is displayed in the controller frequency display. Also, the start frequency field of the selected trace is updated to reflect any changes in this value. Changes in this value are performed by rotation of the tuning wheel, or via the keypad when the FRQ keypad control key is activated. The start frequency entry is limited to within the frequency limits of the scanning receiver. Attempts to exceed these limits will not be accepted.

CW/STOP — The STOP function permits the frequency spectrum of the trace to be varied by changing the frequency point at which the trace ends. Changing this parameter will not affect the actual receiver scan, only the portion of the scan that is displayed on the trace. When this function is activated, the word "STOP", followed by the stop frequency of the trace is displayed on the controller frequency display. The stop frequency field of the selected trace is also updated to reflect any changes to this value. Changes to this parameter are performed by rotation of the tuning wheel or via the keypad, when the keypad control is directed to the frequency parameter. The stop frequency range is limited to the frequency range of the scanning receiver. Any attempts to exceed this range will not be accepted.

PLS/CENTER — The CENTER function varies the center frequency of the segment of the receiver scan that is displayed on the trace. When this function is active, the frequency display window of the controller displays the word "CENTER", followed by the frequency of the center of the trace. This parameter may be varied by rotation of the tuning wheel or via the keypad when the keypad control is directed toward frequency control. Changes in this parameter also cause changes in the start and stop parameters of the trace to maintain the same spectrum width of the trace. The range of this control function is limited by the width of the trace being displayed. Any changes that cause the start or stop parameters of the trace to exceed the scan range of the scanning receiver will not be accepted.

SSB/WIDTH — The WIDTH function varies the width of the spectrum trace, while maintaining a constant center frequency. When this function is active, changes via the tuning wheel or the keypad cause the start and stop frequencies of the trace to vary to accommodate the width changes. The frequency display of the controller displays the word "WIDTH", followed by the frequency width of the selected trace. The range of control of this function is limited by the width of the spectrum of the scanning receiver. Any width entry that causes the start or stop frequency parameters of the trace to exceed that of the receiver scan will not be accepted.

2.3.2.11 **Remote** — The Remote button permits the controller to be placed into the local or remote mode from the front panel. When the WJ-8610A-1 Controller is in the Remote mode of operation, the LED on this button is illuminated. In the local control mode, this LED is extinguished and the operator has full local control.

2.3.2.12 **Handoff** — While in the receiver control mode, the Handoff button will cause the settings presently on the controller front panel to be handed off to another receiver in the system for monitoring. If there is an available receiver on the bus that has been designated as a handoff receiver, the operation will be directed to that receiver. The LED on the HANDOFF button will illuminate and the next available handoff receiver will be indicated in the MEMORY/HANDOFF BW Hz window (HN x). When the keypad ENTER button is pressed, the handoff will be carried out. If no handoff designated receiver is available, the MEMORY/HANDOFF BW Hz window will display HN 0. Entering the desired receiver number, followed by ENTER, completes the operation. From the time that the handoff was initiated until the task is completed, the LED on the Handoff button will be illuminated. While in the trace control mode, only the marker frequency of the selected trace will be handed off.

2.3.2.13 **RCVR Remote** — The Receiver Remote button permits the local operator to set the selected receiver to either the local or remote mode of operation and provides an LED indication of the operating status.

2.3.2.14 **RCVR→Marker** — The Receiver Marker button is used to place the intensified marker of the selected trace under the control of the selected receiver. When this function is activated, the selected marker placement on the trace will reflect the tuned frequency of the station receiver. Marker placement is not limited to within the start and stop frequencies of the trace, therefore, when this function is activated, the marker may not be visable until the receiver is tuned to within the trace spectrum.

2.3.2.15 **Display Freeze** — The Display Freeze button is used to halt the continuous updating of all of the spectrum traces on the external monitor. When this button is pressed, the monitor traces will be frozen with the signal activity that was present at the time. Each of the traces will continue to be refreshed with signal information taken from the trace memory within the controller. While the display is frozen, trace parameter may be changed to expand or contract the frozen trace data.

2.3.2.16 **SPEC FUNC** — Not presently utilized in the standard controller.

2.3.2.17 **K1 Through K5** — These softkeys, adjacent to the CRT, are used in conjunction with the display that is present. Each display that is selected will provide a key menu adjacent to the softkeys, which defines the function of each softkey for that display.

2.3.2.18 **Front Panel Edit Functions** — In addition to the primary functions of each of the front panel buttons, many perform a secondary function to enter label characters when the CRT displays are in their edit modes. The character assignments for each of the buttons are as follows:

KEY FUNCTION	EDIT CHARACTER	KEY FUNCTION	EDIT CHARACTER
RCVR/TRACE	A	AGC	P
STORE	B	AM	Q
EXAM	C	FM	R
EXEC	D	CW	S
COR	E	PLS	T
MGC	F	SSB	U
ANT	G	AFC	V
FRQ	H	REMOTE	W
BFO TUNE	I	HANDOFF	X
TUNE DISAB	J	RCVR REMOTE	Y
BW 1	K	RCVR→MARKER	Z
BW 2	L	DISPLAY FREEZE	→
BW 3	M	SPEC FUNCTION	←
BW 4	N	INC	(SPACE)
		DEC	(SPACE)
BW 5	O	KEYPAD	0-9

2.3.3 CRT CONTROLS AND DISPLAYS

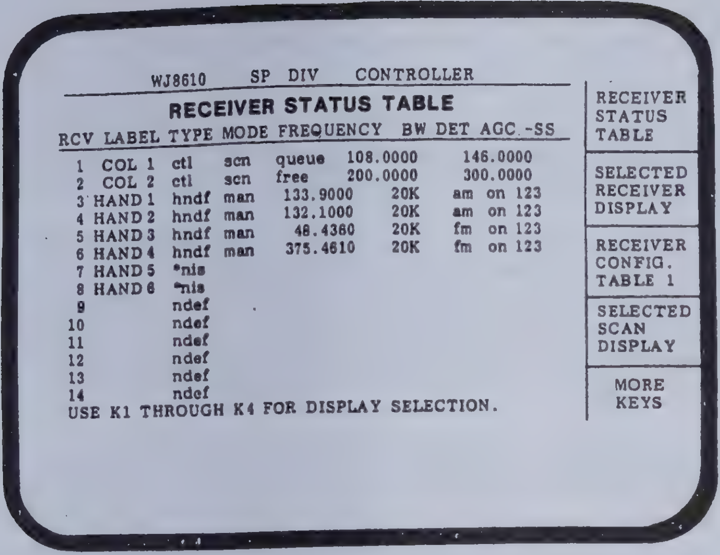
The controller CRT displays and the associated softkeys (K1-K5) provide the local operator with additional operating data pertaining to the system receivers and also provide extended control capabilities that are not normally accessible by the receiver front panel. Each display provides details of the selected operation and defines the softkey functions for that operation. **Figure 2-16** illustrates a flow chart of all the displays and their capabilities in relation to the overall system operation.

Listed along the right edge of each of the CRT displays is a softkey menu which defines the function of each softkey for that display. The first level of each display contains a menu which assigns the task of display selection to each softkey. This display selection menu is a two page menu, with each page assigning a different group of display selections to softkeys K1 to K5. K5, labeled MORE KEYS, switches between the two display selection menus to permit access to all of the selections. In addition, if the softkey that is assigned to the display currently present on the CRT is pressed, a new menu, and in some cases a new display, will appear to permit control or editing of the functions associated with the selected display. Any instructions related to the next available function are displayed on the bottom line of the CRT in inverse video.

2.3.3.1 **Receiver Status Table** — The Receiver Status Table, illustrated in **Figure 2-3,** provides the local operator with an overview of all of the receivers in the system. All of the receivers are listed in receiver station order and in a tabular form, with the basic operating information pertaining to each receiver provided. The information provided in this table is continuously updated by the controller, thus, simultaneously providing up to date information on the operating status of each receiver. In this table, the receiver that is under active control by the controller (the receiver number displayed in the RECEIVER/TRACE window) will have the table entries pertaining to that receiver station intensified for easy identification. Changing the selected receiver number in the RECEIVER/TRACE window will move the intensified line to the newly selected receiver and place that receiver under active front panel control.

Table 2-4. Softkey Display Selection Menu

Page 1:	**K1**	**RECEIVER STATUS TABLE**	Selects the Receiver Status Table on the CRT. See **paragraph 2.3.3.1** for details.
	K2	**SELECTED RECEIVER DISPLAY**	Selects the SELECTED RECEIVER DISPLAY on the CRT. If K2 is pressed while this display is present on the CRT, a new menu to edit the display entries or initialize the selected receiver will be displayed. See **paragraph 2.3.3.2** for details.
	K3	**RECEIVER CONFIG. TABLE 1**	Selects RECEIVER CONFIGuration TABLE 1 on the CRT. When the Receiver Configuration Table is present on the CRT, the menu entry for this key changes to RECEIVER CONFIG. TABLE 2. Refer to **paragraph 2.3.3.3** for details.
	K4	**SELECTED SCAN DISPLAY**	Selects the SELECTED SCAN DISPLAY on the CRT. When the Selected Scan Display is present on the CRT, pressing this button will cause a new softkey menu to appear to exercise the functions that are available with this display, as described in **paragraph 2.3.3.4.**
	K5	**MORE KEYS**	Selects page two of the Softkey Display Menu.
Page 2:	**K1**	**SELECTED TRACE DISPLAY**	Places the SELECTED TRACE DISPLAY on the CRT. If the Selected Trace Display is currently on the CRT, pressing this key will cause a new softkey menu to appear for control of the trace functions. Refer to **paragraph 2.3.3.5** for details on the functions associated with this display.
	K2	**TRACE CONFIG. TABLE**	Selects the TRACE CONFIGURATION TABLE. If the Trace Configuration Table is currently on the CRT, pressing this key will cause a new softkey menu to appear for editing of configuration entires. This display is used to select the number of traces that are to be displayed on the external monitor, and to assign receivers to the displays. For details on the functions associated with this display, refer to **paragraph 2.3.3.6.**
	K3	**CONTROLLER PARAM.**	Selects the CONTROLLER PARAMeter display to view the current set up parameters of the WJ-8610A-1 Controller. When this display is on the CRT, pressing K2 will bring up a new softkey menu which will permit control of the set up functions as detailed in **paragraph 2.3.3.7.**
	K4	**HELP**	This selection will place a HELP display on the CRT to assist in operating the controls associated with the display present on the CRT when Help was selected.
	K5	**MORE KEYS**	Selects page one of the Softkey Display Menu.



```
        WJ8610      SP  DIV     CONTROLLER
          RECEIVER STATUS TABLE
RCV LABEL TYPE MODE FREQUENCY  BW DET AGC -SS
 1  COL 1  ctl   scn  queue  108.0000      146.0000
 2  COL 2  ctl   scn  free   200.0000      300.0000
 3 HAND 1  hndf  man   133.9000    20K    am  on 123
 4 HAND 2  hndf  man   132.1000    20K    am  on 123
 5 HAND 3  hndf  man    48.4360    20K    fm  on 123
 6 HAND 4  hndf  man   375.4610    20K    fm  on 123
 7 HAND 5  *nis
 8 HAND 6  *nis
 9         ndef
10         ndef
11         ndef
12         ndef
13         ndef
14         ndef
USE K1 THROUGH K4 FOR DISPLAY SELECTION.
```

Figure 2-3. Receiver Status Table Display

The table entries assocoiated with the Receiver Status Table are as follows:

RCV — The RCV (Receiver) column lists the receiver stations in order from 1 through 14.

LABEL — The LABEL column will contain a six character alpha-numeric label which is assigned by the user, for identification of the receiver station. See the SELECTED RECEIVER DISPLAY for details on label assignments.

TYPE — The TYPE column indicates the type of operation that is assigned to the receiver at each receiver station. Entries in this column will be: ndef (not defined); mntr (monitor); fixd (fixed); hndf (handoff); ctl (control); or pthr (pass-through). Details on receiver type assignments are provided in the SELECTED RECEIVER DISPLAY description.

MODE — The MODE column indicates the mode of operation that is assigned to the receiver at each receiver station. Entries in this column will be: man (manual); scn (scan); stp (step); stc (step continue); or scc (scan continue). Details on receiver mode assignments are provided in the SELECTED RECEIVER DISPLAY description.

FREQUENCY — The FREQUENCY column lists the actual tuned frequency of each of the receivers. Any frequency changes to any of the receivers will cause this display field to update to reflect the new information.

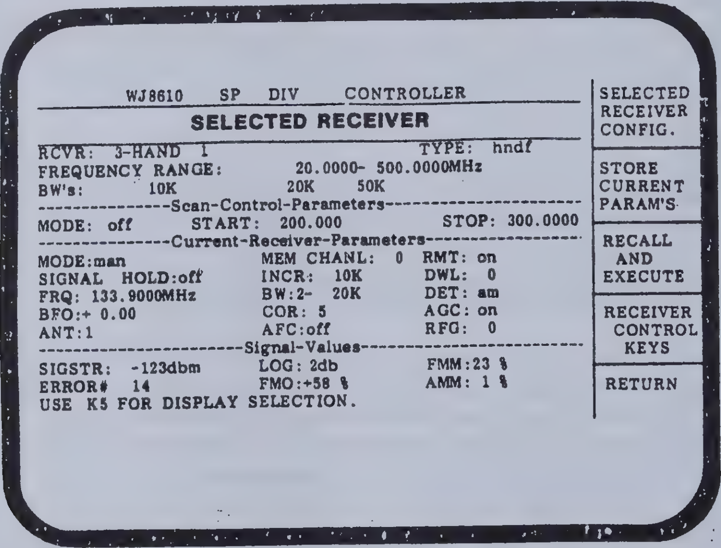
BW — Entries in this column list the currently active IF Bandwidth numbers in all of the active receiver stations.

DET — The DET column lists the selected detection mode for each receiver station. Depending on the detection capabilities of the receiver at each station, the entries in this column may consist of: am, fm, cw, pls, lsb, or usb.

AGC — The AGC column indicates, for each receiver station, if Automatic Gain Control is active (entry=1), or if the Manual Gain Control mode is selected (entry=0).

-SS — The -SS column gives a continuously updated indication of the signal activity at each receiver station. The values listed in this column will reflect the value that is displayed in the signal strength windows of each of the receivers. If the signal activity at the receiver exceeds the programmed COR threshold for that receiver, an asterisk (*) will be displayed adjacent to the appropriate signal strength entry.

2.3.3.2 **Selected Receiver Display** — The Selected Receiver Display, illustrated in **Figure 2-4**, provides full details of the configuration, control settings, operational mode and signal activity of the receiver that is currently under front panel control (the receiver station displayed in the RECEIVER/TRACE window). In addition, the control functions associated with this display permit direct access to the selected receiver's Step, Scan and Lockout operations. From this display, the memory within the selected receiver may be programmed for use in scan or step operations. Also, lockout frequencies may be entered into the receiver's memory, which prevent undesired signal activity from interrupting an active scan sequence. Refer to the appropriate receiver manuals for complete details of Scan, Step and Lockout operations, as they apply to the particular receiver type.



```
        WJ8610    SP   DIV    CONTROLLER
              SELECTED RECEIVER
RCVR:  3-HAND  1                       TYPE:  hndf
FREQUENCY RANGE:        20.0000- 500.0000MHz
BW's:      10K             20K     50K
---------------Scan-Control-Parameters-----------------------
MODE:  off      START:  200.000              STOP:  300.0000
---------------Current-Receiver-Parameters-------------------
MODE:man                MEM CHANL:  0  RMT:  on
SIGNAL  HOLD:off        INCR:  10K     DWL:   0
FRQ: 133.9000MHz        BW:2-  20K     DET:  am
BFO:+ 0.00              COR:  5        AGC:  on
ANT:1                   AFC:off        RFG:   0
----------------------Signal-Values--------------------------
SIGSTR:  -123dbm        LOG: 2db        FMM:23 %
ERROR#   14             FMO:+58 %       AMM:  1 %
USE  K5 FOR DISPLAY SELECTION.
```

Figure 2-4. Selected Receiver Display

The initial Selected Receiver display is subdivided into four sections, each containing related data items. In the upper section, the display provides information about the basic configuration of the selected receiver. This is information that has been obtained by the controller during a FIND AND LEARN operation (see **paragraph 2.3.3.7,** Controller Parameter Display) or input by the user in the Edit mode of this display. The information provided in this display section is intended to assist in the selection of a receiver for a particular operational assignment.

RCVR: — This field contains the number of the receiver station that is presently being displayed, and the user assigned label for that receiver. By assigning the keyboard operation to receiver selection (RECEIVER/TRACE button illuminated), the Selected Receiver Display for any of the occupied receiver stations may be called.

TYPE: — The TYPE field contains the type assignment that has been given to the receiver. This assignment is selected in the Edit mode and determines how the selected receiver will react to controller commands.

FREQUENCY RANGE: — This field contains the user selected lower and upper tuning limits for the selected receiver. Regardless of the actual tuning range of the receiver, tuning by way of the controller front panel will be limited to this range. This range is selected in the Edit mode to restrict the selected receiver's tuning to a user specified portion of the receiver's range. This information was determined during FIND AND LEARN.

BW'S: — The five entries associated with this field contain the actual frequency value of the bandwidths that are installed in the receiver at the selected receiver station. During a LEARN, or FIND AND LEARN operation, the controller queries the receiver for the values in this field. However, the values may be updated in the Edit mode.

The second section of the Selected Receiver display contains Scan-Control-Parameters. This section displays parameters that are associated with scan operations which have been initiated from the Selected Scan Display only (see **paragraph 2.3.3.4**). Scans initiated from the Selected Receiver display will not affect this display section.

MODE: — The MODE field indicates the type of scan that is in progress. If the selected receiver is not scanning due to a selection from the Selected Scan Display, the entry in this field will be "off". Otherwise, the type scan will be indicated (free, hold, queue).

START: — This field will contain the start frequency of a scan operation that has been initiated from the Selected Scan Display.

STOP: — This field will contain the stop frequency of a scan operation that has been initiated from the Selected Scan Display.

The Current-Receiver-Parameters section of the display provides a tabular listing of all of the current settings of the selected receiver. The same parameters that are accessable to the user from the front panel LED displays are listed here for easy viewing. This display section is useful for overviewing the current operating status and also for setting up data for memory storage and recall.

MODE: — The MODE field contains the selected receiver's current operating mode. During manual control operations, the field contains "man". When scanning or stepping, "scn" or "stp" is displayed to indicate that a scan or step sequence is in progress. In either of these automatic search modes, "scc" (scan continue) or "stc" (step continue) will be displayed if the receiver stops on an encountered signal and will remain as long as the receiver is locked on the signal.

SIGNAL HOLD: — The SIGNAL HOLD field determines how the receiver will respond on acquisition of a signal during a scan or step operation that has been initiated from the Selected Receiver display. If "off" is displayed, the receiver will lock onto the acquired signal and will continue the search when the signal is lost. When "on" is displayed in this field, the receiver will stop on the acquired signal and remain until commanded to continue, regardless of whether the signal is still present or not.

FRQ: — This Frequency field displays the current tuned frequency of the selected receiver. In a scan or step operation, the last fixed frequency that the receiver was tuned to will be displayed, and will be updated to the new signal frequency each time the receiver locks onto a signal.

BFO: — The BFO field contains the frequency offset of the selected receiver's Beat-Frequency-Oscillator.

ANT: — This field displays the antenna input that is active on the selected receiver. (Function not presently utilized).

MEM CHANL: — This field displays the last accessed memory channel of the selected receiver.

INCR: — The INCR field contains the size of the frequency increment that will be used during a scan operation that has been initiated from this display. If the selected receiver is a WJ-8615 or WJ-8615D Receiver, this field contains the actual size of the scan increment. For WJ-8617B, WJ-8618B and WJ-8619 Receivers, the value in this field will determine if full or half bandwidth increments will be taken. Values equal to or greater than the active bandwidth will cause full bandwidth increments. Half bandwidth increments will be taken if this value is less than the active bandwidth.

BW: — This field displays the active bandwidth of the selected receiver, by number, and by its actual bandpass frequency.

COR: — The COR field displays the selected receiver's Carrier-Operated-Relay threshold setting.

AFC: — The AFC field contains the status of the selected receiver's Automatic Frequency Control (on or off).

RMT: — The RMT field indicates whether the selected receiver is in the local (off) or remote (on) mode of operation.

DWL: — This field contains the selected receiver's scan and step DWELL time. When the receiver station contains a WJ-8617B, WJ-8618B or WJ-8619 Receiver, this value determines the time that the receiver pauses between each frequency increment or step. WJ-8615 and WJ-8615D Receivers do not utilize this parameter.

DET: — The active detection mode of the selected receiver is contained in this field (am, fm, cw, pls, lsb, usb).

AGC: — This field contains the status of the selected receiver's Automatic Gain Control (on or off).

RFG: — The RFG field contains a value ranging from 0 to 255, which controls the RF/IF Gain setting of the selected receiver when the receiver is in the Manual Gain Control mode (AGC off). A value of "0" indicates minimum gain and "255" indicates maximum gain. This field will not affect receiver gain when AGC is on.

The final section of the initial Selected Receiver display, labeled Signal-Values, provides continuously updated data pertaining to received signals and also contains a field to define any receiver generated error messages.

SIGSTR: — This field contains data pertaining to the signal strength of a received signal. When the selected receiver is in the Automatic Gain Control mode (AGC on), the value in this window indicates the signal strength (dBm). In the Manual Gain Control mode (AGC off), the percentage of AM detector utilization is displayed (%).

ERROR#: — This field will display the last received error condition that has been reported. Refer to **Table 2-12** for the error codes associated with the receiver operation.

LOG: — The LOG field contains the instantaneous value of the receiver's log video circuit.

FMO: — The FMO field indicates the relationship between the selected receiver's tuned frequency and the actual frequency of the received signal. This value will indicate the percentage of frequency offset, with respect to the selected IF bandwidth. The receiver is considered to be on frequency when this value is +/-20% or less.

FMM: — The FMM field contains a value representing the amount of frequency modulation that is present on the received signal. This value is expressed as a percentage of the active IF bandwidth of the selected receiver.

AMM: — The AMM field contains a value that represents the amount of amplitude modulation contained in a received signal. This value is expressed as a percentage of modulation with respect to its RF carrier.

When the Selected Receiver display is first selected, the display comes up on the CRT with its softkey menu in the display select mode, as illustrated in **Table 2-4.** Pressing the SELECTED RECEIVER DISPLAY softkey (K2), when this display is present on the CRT, places the display into its operational mode and redefines the softkey functions. The first set of operational softkeys provides a choice of viewing and editing the selected receiver's configuration; storage and recall of receiver memory data; and the selection of the selected receiver control mode to control the operational functions associated with this display. These operational softkeys and their basic functions are described in **Table 2-5.**

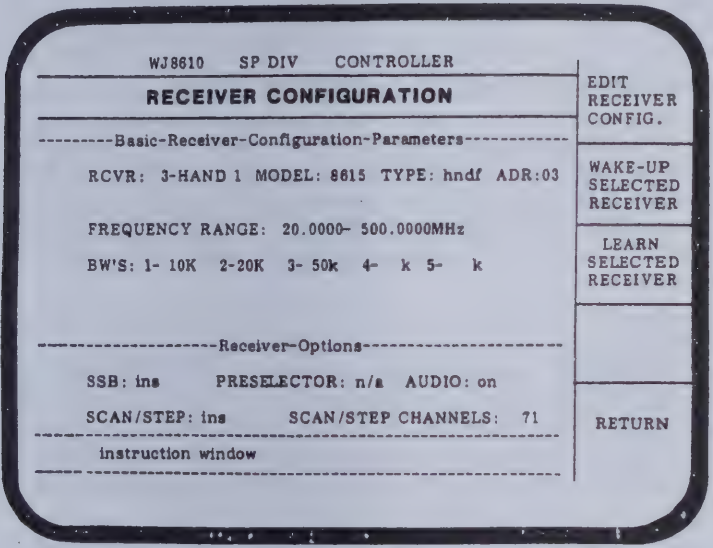
2.3.3.2.1 **Selected Receiver Configuration Softkey (K1)** — From the operational menu of the Selected Receiver Display, described in **Table 2-4**, pressing the Selected Receiver Config. key (K1) brings a new display to the CRT and redefines the softkey menu to enter and edit the display fields. This display provides detailed configuration information about the selected receiver's capabilities, the options that are installed, and also permits memory partitioning (when a WJ-8615 or WJ-8615D Receiver is installed in the selected receiver station). This Receiver Configuration display, illustrated in **Figure 2-5,** provides the detailed configuration data that is used by the other displays to list the operating capabilities of the selected receiver. Any updates to its data fields will also affect the associated fields on the other displays.

Table 2-5. Selected Receiver Display Operational Softkey Menu

K1	**SELECTED RECEIVER CONFIG.**	The Selected Receiver Configuration softkey calls a Receiver Configuration display to the CRT, which displays the receiver's basic operating capabilities and the options that are available to that receiver. The softkey menu associated with this display assists in updating the display fields. See **paragraph 2.3.3.2.1.**
K2	**STORE CURRENT PARAM'S**	The Store Current Parameters key is used to direct the receiver parameters that are in Current-Receiver-Parameters section of the display into the receiver's memory. See **paragraph 2.3.3.2.2.**
K3	**RECALL AND EXECUTE**	Pressing the Recall And Execute softkey causes data from the selected memory channel of the active receiver to be retrieved and used to set the receiver to the parameters stored in that memory channel.
K4	**RECEIVER CONTROL KEYS**	The Receiver Control Keys button causes a new softkey menu to be displayed for use in controlling scan, step and lockout operations as described in **paragraph 2.3.3.2.4.**
K5	**RETURN**	This key returns the Display Select softkey menu to the CRT for selection of a different display. See **Table 2-4.**

With the display illustrated in **Figure 2-5** (Receiver Configuration) present on the CRT, four control options are available to either modify the display entries, reset the selected receiver's remote interface, or return to the Selected Receiver display and its operational softkey menu. The softkey menu associated with this display and its control functions are as follows:

K1 **EDIT RECEIVER CONFIG.** The Edit Receiver Config. mode permits any of the configuration fields to be manually updated to reflect any changes in the selected receiver's configuration. When this mode is selected, the softkey menu is redefined to perform edit functions. Softkeys K1 and K2 are assigned PREVIOUS PARAM. and NEXT PARAM., respectively, to move a reverse field cursor to any desired field for update. Softkey K5 (CONCLUDE EDIT) is used to exit the edit mode when the update is complete. As the cursor is moved to each field, the instruction window at the bottom of the display provides helpful instructions for updating the selected field.



```
WJ8610    SP DIV    CONTROLLER
RECEIVER CONFIGURATION
---------Basic-Receiver-Configuration-Parameters------------
RCVR: 3-HAND 1  MODEL: 8615  TYPE: hndf  ADR:03

FREQUENCY RANGE:  20.0000- 500.0000MHz
BW'S: 1- 10K   2-20K   3- 50k   4-   k  5-   k

-------------------Receiver-Options---------------------
SSB: ins       PRESELECTOR: n/a   AUDIO: on
SCAN/STEP: ins       SCAN/STEP CHANNELS:  71
--------------------------------------------------------
 instruction window
--------------------------------------------------------
```

Figure 2-5. Receiver Configuration Display

NOTE

Before changing the Model, Frequency Range, Bandwidth or Option Fields, verify the actual receiver's capabilities. Confilicts between the receiver's capabilities and the Receiver Configuration Display entries may have unpredictable results.

RCVR: — In the RCVR field, only the selected receiver's label may be updated. The number is fixed by the receiver station selection. The label field may contain up to six characters, from the choices listed in **paragraph 2.3.2.18**. Entries into this field are made by pressing the appropriate front panel button for the desired character. The edit character associated with each button is indicated on the front panel, directly above the button. Changes must be terminated with ENTER.

MODEL: — The Model field contains the type number of the receiver that is installed at the selected receiver station. This field is modified by using the keypad INC and DEC keys to increment or decrement through the list of allowable choices.

8619	8616
8618	8615
8617	undf

TYPE: — In the Type field, the receiver type entry determines how the selected receiver will respond to controller commands. This field is used to specify the type of operation that the receiver will perform in the receiving system. When the cursor is in this field, type selection is performed using the INC and DEC keys on the keypad to increment or decrement through the list of allowable entries.

ndef — This selection effectively removes the selected receiver from the system. No control will be exercised from the controller. Anytime that this receiver station is selected, the controller indicators will blank, indicating that no active receiver is present at the selected station, and the digital display will indicate "NOT IN SERVICE".

mntr — The monitor type will permit the controller to monitor the receiver operations and display the receiver parameters, but will not permit any control to be exercised by the controller. This mode is used when the receiver is to be operated locally by a local operator, with the controller performing a monitor function only. Placing the receiver into the remote mode, or changing the type entry will restore the controller's control capabilities.

hndf — When the handoff type is selected, the receiver is placed into a handoff queue and will be available for automatic or manual handoffs. Until the receiver accepts a handoff, the controller maintains full control over its operation. Once a handoff is accepted, the receiver enters its local mode of operation. To reinsert the receiver into the handoff queue, the controller must return the receiver to the remote mode of operation or the receiver may be returned to the remote mode from its front panel. Control of a handoff receiver from the controller will restore rmt/lcl status to the mode it was in prior to the change.

ctl — The control type provides the controller with full control over all of the receiver's capabilities. Any feature that is present in the selected receiver may be exercised by the controller at any time. The selected scan menu functions are only available to ctl or hndf receivers.

pthr — The passthrough type selection is similiar to the ndef type, in that the controller performs no control or monitoring functions. However, with this type, an external system computer may access the receiver through the WJ-8610A-1 Controller. The controller will transfer communications between the computer and receiver, but will not error check or act on any of these communication messages.

ADR: — The address field displays the selected receiver's receiver control bus address. This address may be changed to any value in the range from 0 to 25, using the keypad. Values may be directly entered, or the INC and DEC keys may be used. Care must be exercised when changing this field to avoid duplicating an address that is already assigned to another receiver. This does not change the receiver address. It is provided to allow manual placement of receivers to stations.

FREQUENCY RANGE: — The Frequency Range field is a dual entry field which determines the frequency range that may be tuned by the controller. The first entry is the low end of the tuning range and the second is the high end. Each of these entries are entered from the keypad and may be any range within the tuning capability of the receiver. This tuning limitation is useful in operations that require that the receiver remain within a specified portion of the frequency spectrum.

BW'S: — The bandwidth field displays the actual IF bandwidth value for each of the five possible IF bandwidth locations in the selected receiver. Each of the locations may be changed to any desired value using the keypad, to reflect any changes in the configuration of the selected receiver. Any bandwidth location that is not used in the active receiver will have a blank entry. Bandwidths may be disabled from controller selection by entering '0'.

SSB: — The SSB field indicates if the Single Sideband option (ISB for WJ-8615 and WJ-8615D) is present in the selected receiver (ins) or not available (n/a). If single sideband is present in the receiver, it may be turned on or off using the INC and DEC keypad keys to permit or prohibit SSB selection. However, if the option is not present, turning it on will cause errors on selection.

PRESELECTOR: — The preselector field indicates if the Tracking Preselector option (WJ-8615 and WJ-8615D Receivers only) is present (ins) or not available (n/a) in the selected receiver. If the preselector is present, it may be turned on or off, using the keypad INC and DEC keys. However, if the option is not present, turning it on will cause errors on selection.

AUDIO: — This field affects WJ-8615 and WJ-8615D Receivers that are equipped with the Selected Audio Output option only. The entry in this field determines if audio signals will be sent to the controller when the receiver is selected. The keypad INC and DEC keys are used to turn the audio output of the receiver on or off. However, if the option is not present, an attempt to turn it on will not be accepted.

SCAN/STEP: — The Scan/Step field is used in conjunction with WJ-8615 and WJ-8615D Receivers to indicate if the SSL option is installed in the selected receiver. The INC and DEC keypad keys permit enabling (ins) or disabling (n/a) the SSL option as desired. However, the option hardware must be present in the receiver to enable this capability. This option must be present, and active, in the receivers at stations 1 through 4 if they are to be used as display type receivers.

STEP/SCAN CHANNELS: — This field is used with WJ-8615 and WJ-8615D Receivers only. It is used to partition the selected receiver memory for step, scan and lockout channels (see WJ-8615/SSL Option manual). The value in this field indicates the number of memory channels that are designated as step or scan channels. The remaining memory is set aside for lockout channels.

CAUTION

The entry in this field must be set prior to using lockout or programming the memory. Any data previously stored in the receiver memory will be lost when partitioning occurs.

K2 **WAKE-UP SELECTED RECEIVER** The Wake-Up Selected Receiver Softkey is used in cases where the selected receiver is not responding to controller commands or queries due to a lock up of the receiver's remote interface. Pressing K2 resets the interface to return it to normal operation. This operation will not disturb the present receiver settings, nor will it interfere with receiver configuration data stored in the controller's memory. Only in cases of receiver interface lock up will this Wake-Up key show any visable indications.

K3 **LEARN SELECTED RECEIVER** The Learn Selected Receiver key is used to query the active receiver to obtain its basic configuration parameters and option status. Pressing this key causes the controller to query the receiver at the active receiver station and update the configuration table with the newly acquired data. This function is useful when drastic changes have been made to the selected receiver's configuration; when the selected receiver is replaced with a new receiver, having the same bus address as the original unit; or if the receiver address has been entered for manual system configuration.

K4 **NOT USED**

K5	**RETURN**	The Return key exits the Receiver Configuration operational mode and returns the CRT to the Selected Receiver display and softkey menu illustrated in **Figure 2-4.**

2.3.3.2.2 **Store Current Param's Softkey (K2)** — The Store Current Param's softkey is used to store parameter settings into the memory of the selected receiver. This function is necessary to program the receiver's memory before entering into a scan or step operation that is initiated from the Selected Receiver display control keys. Before programming is attempted, be sure that the receiver memory is properly partitioned for the desired scan/step and lockout channels, as the partitioning operation will clear any previously stored memory data (see SCAN/STEP CHANNELS field in **paragraph 2.3.3.2.1**).

1. Using the appropriate front panel controls and display designated softkeys, set up the parameter fields in the Current-Receiver-Parameters section of the Selected Receiver display to the desired values.

2. When the desired parameters are set up, press K2 (Store Current Param's) to enter into the storage mode. The LED on the keypad ENTER button will illuminate and the instruction window in the CRT indicates the next available receiver memory channel.

3. If the value in the instruction window is the desired storage destination, press ENTER to complete the data storage. Otherwise, enter the desired memory channel at the keypad, followed by ENTER. When the data storage is completed, the memory field in the display will increment to indicate the next channel that is available to accept data storage.

2.3.3.2.3 **Recall And Execute Softkey (K3)** — The Recall And Execute softkey is used to retrieve data that is stored in the receiver's memory and cause the receiver to set up to the parameters that were extracted from the selected memory channel. This function is useful in reviewing and updating stored memory data and in retrieving stored receiver settings when the memory is utilized as a scratch pad memory to store frequently used parameters.

1. To exercise the Recall and Execute function to retrieve data from the selected receiver's memory, press K3 (Recall And Execute). The LED on the keypad ENTER key will illuminate and the instruction window in the CRT will display the memory channel from which the data will be recalled.

2. Using the keypad, enter the desired memory channel, followed by ENTER to complete the operation.

2.3.3.2.4 **Receiver Control Keys Softkey (K4)** — The Receiver Control Keys selection places the CRT display and the softkey menu into the control mode of operation. When this key is pressed, three pages of softkey menus are available, each of which redefine the softkey functions to perform specific control operations.

The first page of the Control Softkeys menu that comes up on the CRT controls the initiation and halting of a scan or step operation. These operations utilize parameter data that has been preprogrammed into the selected receiver's memory, as described in **paragraph 2.3.3.2.2**, Store Current Param's Softkey (K2). Unless proper memory programming has been performed prior to executing a scan or step operation from this display, an error condition may result.

K1 SCAN Pressing the Scan softkey initiates a scan operation, using data that has been preprogrammed into the selected receiver's memory. When this button is first pressed, the display instruction window requests the memory channel which will be acted on. Entering the appropriate memory channel at the keypad, followed by ENTER, causes the scan to begin. If the selected receiver is a WJ-8617B, WJ-8618B, or WJ-8619 Receiver, the memory channel entered determines if a single sector or multiple sector scan will be performed. Entering an even numbered channel causes the scan to start at the selected channel number and continue until it reaches the frequency that is stored in the next higher odd numbered channel. This single sector scan will continue until a signal is acquired or until it is stopped by the operator. If an odd number is entered to initiate the scan, a multiple sector scan will be performed. The first sector to be scanned will be the sector determined by the data stored in channels 0 and 1, and the stop frequency of the final sector will be determined by the channel number entered at the initiation of the scan. All even/odd channel pairs in between will also be scanned. For receiver stations containing WJ-8615 or WJ-8615D Receivers, only single sector scans will be performed. The scan will begin using parameter data obtained from the memory channel entered to initiate the scan, and continue to the frequency contained in the next higher channel number. In all receiver cases, the start channel of each sector must contain a frequency that is less than the stop channel frequency.

K2 STEP Pressing the step softkey initiates a step operation, utilizing data that has been preprogrammed into the selected receiver's memory. When this key is pressed, the instruction window on the display requests a memory channel entry. Entering the number of the last channel that will be used in the step sequence, followed by ENTER, starts the step sequence at channel 0. Each channel, up to the number entered to activate the operation, will be included in the step sequence. In the Step mode, the sequence will always start at channel 0, and step through each successive channel that contains valid memory data.

K3 PAUSE OR CONTINUE The Pause Or Continue key causes a scan or step operation that is in progress to be temporarily halted, and places the receiver into the Scan Continue or Step Continue mode of operation. When the sequence is halted using this key, it may be restarted at the point where the halt occurred by pressing K3 a second time.

K4 MANUAL (STOP) The Manual (Stop) key ends a scan or step sequence and places the selected receiver into the full manual mode of operation. Once this button is pressed, the scan or step operation may only be restarted from the beginning. The Pause Or Continue key will not restart the sequence.

K5 MORE KEYS The More Keys button calls up the next control keys menu to permit control of operations that are associated with the receiver's lockout memory.

The second page of the Receiver Control Keys menu controls lockout memory programmimg and clearing of the selected receiver's memory. The operations that are performed from this menu will also affect scans that have been initiated from the Selected Scan Display, as that display also obtains lockout data from the receiver's memory.

K1 LOCKOUT CURRENT FREQ. The Lockout Current Freq. key is used to program a lockout channel into the selected receiver's memory. This operation may be performed when the receiver is in the manual, scan continue, or step continue modes of operation. Once a lockout channel has been created, all signal activity within the lockout bandwidth will be ignored by that receiver when a scan is in progress, thus, preventing undesired signals from interferring with a scan sequence. The lockout channels are unique to the receiver into which they are programmed and will have no affect on the signal acquisition of any other receiver in the system.

To program a lockout channel into the selected receiver's memory, first set the FRQ field of the Current-Receiver-Parameters section of the display to the center frequency of the spectrum to be locked out. Next, press K1 (Lockout Current Freq.) to initiate the lockout. The instruction window will request that the frequency width of the lockout spectrum be entered. Using the keypad, select the desired frequency width and complete the entry by pressing ENTER. The width of the lockout spectrum for WJ-8617B, WJ-8618B and WJ-8619 Receivers will always be equal to the IF bandwidth that is active at the time of entry, regardless of the width that is entered. When the selected receiver station contains a WJ-8615 or WJ-8615D Receiver, be sure that the receiver's memory has been properly partitioned to allot space for lockout channels.

K2 UN-LOCK CURRENT FREQ. The Un-Lock Current Freq. key is used to remove a frequency from the selected receiver's memory and permit the scanning receiver to again recognize signal activity in that spectrum as valid signal contacts. Placing the center frequency of the lockout into the FRQ field of the Current-Receiver-Parameters portion of the display, and pressing K2, removes that lockout channel from memory. No other data in the memory will be affected. If the frequency entry is not that of an existing lockout, a "Not A Valid Lockout Frequency" error number will occur.

K3 CLEAR LOCKOUT MEMORY The Clear Lockout Memory key clears all lockout channels in the selected receiver's memory. Only the lockout frequencies will be cleared, leaving the scan and step memory parameters untouched.

K4 CLEAR RECEIVER MEMORY The Clear Receiver Memory key removes all data from the selected receiver's memory. When this key is pressed, scan, step, and lockout channels are completely erased from the receiver's memory.

K5 MORE KEYS The More Keys button calls up the final Control Keys menu.

The final softkey menu that is associated with the Receiver Control Keys menu selection. permits operations such as dwell setting. hold mode, memory recall, and scan increment selection. Selections from this menu update their associated fields in the Current-Receiver-Parameters portion of the display.

K1 **SET DWELL** The Set Dwell softkey controls the setting of the dwell parameter for WJ-8617B, WJ-8618B, and WJ-8619 Receivers. This parameter selects the amount of time that the scanning or stepping receiver pauses between each frequency increment or step. When this softkey is pressed, the instruction window requests that a value be entered at the keypad. representing the desired pause time. Entering "0" selects the minimum dwell time, with the dwell time increasing as the value of the numerical entry increases. The maximum dwell time is selected by entering a value of "255".

K2 **TOGGLE HOLD MODE** The Toggle Hold Mode key controls the entry in the Signal Hold field of the display. As the softkey label implies, this key performs a toggle function to turn the Hold mode "on" or "off". When the Signal Hold entry is "off", the scanning or stepping receiver will stop on signal activity and continue the sequence when the signal level falls below the programmed COR threshold. When "on", the receiver will stop on signal activity and remain until commanded to continue.

K3 **SELECT RECALL (8617)** This control key is provided to utilize the recall mode of operation for WJ-8617B, WJ-8618B, and WJ-8619 Receivers. It permits the examining of the memories of these receivers without actually setting the receiver to the parameters stored in memory. When this button is pressed, any memory channel from the selected receiver may be recalled to the Current-Receiver-Parameters display for viewing. The desired memory channel is selected at the keypad.

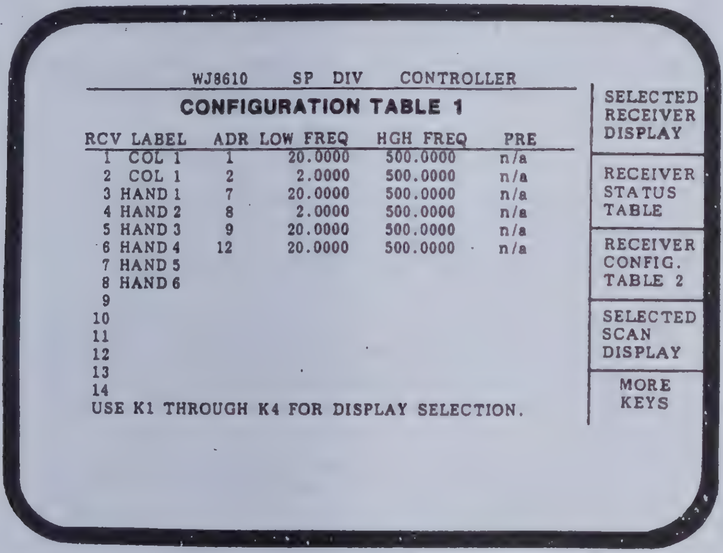
K4 **SET SCAN INCREMENT SIZE** This control key is used primarily with WJ-8615 and WJ-8615D Receivers to determine the size of the frequency increments that are taken during the scan. When this key is pressed, the instruction window requests that the desired increment size be entered at the keypad. This entry may range from 10kHz to 1MHz. If the selected receiver is a WJ-8617B, WJ-8618B, or WJ-8619 Receiver, the value that is entered will determine if the receceiver will scan in full or half bandwidth increments. If the entry is equal to or greater than the programmed IF bandwidth, the scan will be performed in frequency increments that are equal to the active IF bandwidth. If the size value is less than the programmed IF bandwidth, the frequency increments will be equal to one half of the bandwidth.

K5 **RETURN** The Return key exits the Receiver Control Keys menu and returns the display to the Operational Softkey menu, as described in **Table 2-5.**

2.3.3.3 **Receiver Config. Table** — The RECEIVER CONFIGURATION TABLE is a two page display, illustrated in **Figure 2-6** and **Figure 2-7**, which provides a listing of the basic configuration of each of the receivers in the system. It permits the viewing of the capabilities of all of the receivers simultaneously. The first table, Configuration Table 1, lists the user assigned label for each receiver, its IEEE-488 bus address, its user selected frequency range and whether or not the receiver is equipped with an RF preselector. In the PRE column, "ins" indicates that a preselector is installed and available for use, while "n/a" indicates that the preselector is not available for use or not installed.

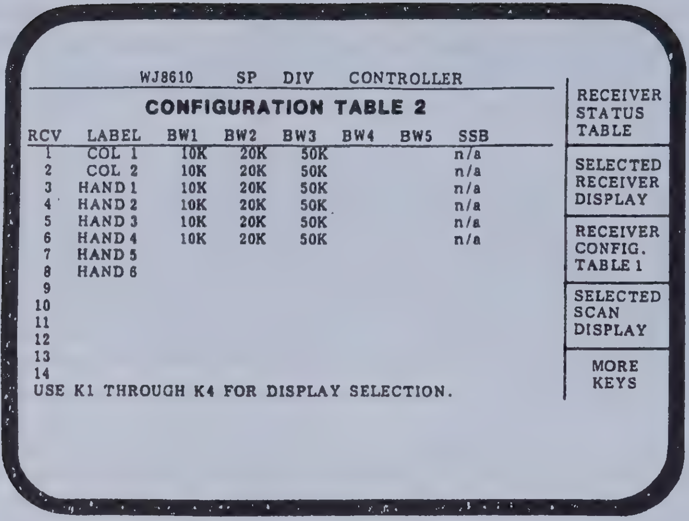
When Configuration Table 1 is present on the CRT, the display selection menu for the softkeys assigns the label RECEIVER CONFIG. TABLE 2 to K3, which will be used to select Configuration Table 2. Configuration Table 2 provides the second page of configuration data for each receiver. The receiver number and label are repeated from the first page, followed by five bandwidth columns and an SSB column. The bandwidth columns display the IF bandwidth value installed in each bandwidth slot. The final column, labeled "SSB" indicates if single sideband detection is available. If this option is installed, and available for use, "ins" will be displayed, otherwise "n/a" will be listed. When Table 2 is present on the CRT, pressing K3 (RECEIVER CONFIG. TABLE 1) will cause the first table to be returned.

No edit mode or operational functions are associated with this display. All table entries are extracted from the Selected Receiver Display and listed in tabular form for review only. However, any configuration changes performed to the Selected Receiver Display will also cause the appropriate entry in this table to be updated.



```
          WJ8610      SP  DIV     CONTROLLER
         CONFIGURATION TABLE 1
RCV LABEL    ADR LOW FREQ    HGH FREQ     PRE
  1  COL 1    1     20.0000   500.0000    n/a
  2  COL 1    2      2.0000   500.0000    n/a
  3 HAND 1    7     20.0000   500.0000    n/a
  4 HAND 2    8      2.0000   500.0000    n/a
  5 HAND 3    9     20.0000   500.0000    n/a
  6 HAND 4   12     20.0000   500.0000    n/a
  7 HAND 5
  8 HAND 6
  9
 10
 11
 12
 13
 14
 USE K1 THROUGH K4 FOR DISPLAY SELECTION.
```

Figure 2-6. Receiver Configuration Table 1



WJ8610 SP DIV CONTROLLER

CONFIGURATION TABLE 2

RCV	LABEL	BW1	BW2	BW3	BW4	BW5	SSB
1	COL 1	10K	20K	50K			n/a
2	COL 2	10K	20K	50K			n/a
3	HAND 1	10K	20K	50K			n/a
4	HAND 2	10K	20K	50K			n/a
5	HAND 3	10K	20K	50K			n/a
6	HAND 4	10K	20K	50K			n/a
7	HAND 5						
8	HAND 6						
9							
10							
11							
12							
13							
14							

USE K1 THROUGH K4 FOR DISPLAY SELECTION.

Figure 2-7. Receiver Configuration Table 2

Selecting the HELP display with the Receiver Configuration Table present and the CRT will provide a brief description of this display to assist in its use. The HELP key will call up the following display:

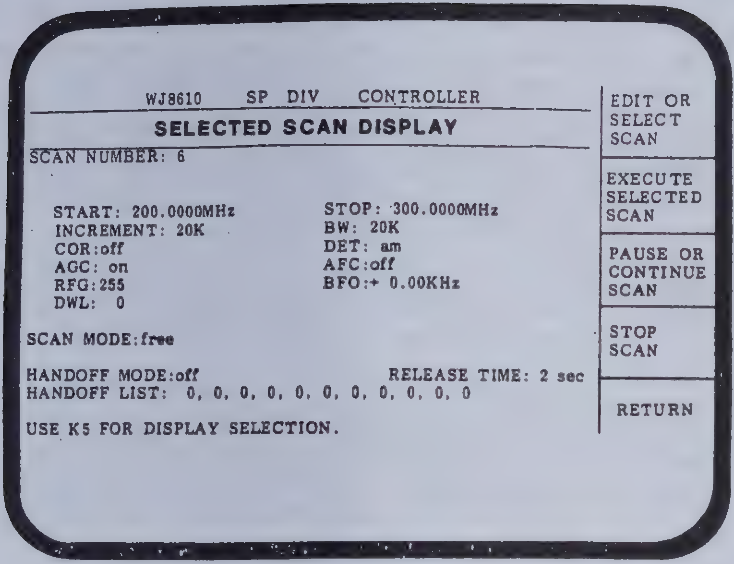
RECEIVER CONFIGURATION TABLE HELP

Table of available receiver configuration.

Table 1 shows ReCeiVer number, user entered LABEL, LOWest tunable FREQuency, HiGHest tunable FREQuency and status of PREselector option.

Table 2 shows ReCeiVer number, user entered LABEL, BandWidth size in positions 1 to 5 and the status of the SSB option.

2.3.3.4 __Selected Scan Display__ — The Selected Scan Display, illustrated in **Figure 2-8,** is used to set up, edit, and execute scanning operations, using parameter set ups that are stored in the controller's scan memory (only on ctl receivers). Up to thirty complete sets of commonly used scan parameters may be stored into the controller's memory and may be rapidly retrieved and directed to any of the system receivers when needed. When a scan operation is initiated from this display, all of the necessary parameters are retrieved from the controller's scan memory and are rapidly loaded into the first two memory channels of the selected receiver. As soon as the data is transferred, the scan begins.


WJ8610 SP DIV CONTROLLER

SELECTED SCAN DISPLAY

SCAN NUMBER: 6

START: 200.0000MHz
STOP: 300.0000MHz
INCREMENT: 20K
BW: 20K
COR:off
DET: am
AGC: on
AFC:off
RFG:255
BFO:+ 0.00KHz
DWL: 0

SCAN MODE:free

HANDOFF MODE:off
RELEASE TIME: 2 sec
HANDOFF LIST: 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

USE K5 FOR DISPLAY SELECTION.

Figure 2-8. Selected Scan Display

This display functions as a memory window to review data stored in each scan channel, create new scan set up channels, and control a scan operation that has been initiated from this display. Using the operational softkeys associated with this display, any one of the thirty preprogrammed scan channels may be called to the CRT from the controller's memory and this data may be directed to any system receiver that is capable of executing a scan operation. Once the scan has been initiated, the scan channel number, or any of the parameters in the current display, may be changed without affecting the scan that is in progress. However, if after any changes have been made to the display, the Execute Selected Scan key (K2) is pressed, the new parameters will be sent to the selected receiver to initiate a new scan. If the selected scanning receiver has been programmed to contain lockout channels (see Selected Receiver Display **paragraph 2.3.3.2**), the lockouts will be observed in the same manner as in Selected Receiver Display initiated scans.

When the Selected Scan Display is first called up on the CRT, it is displayed with the display select softkey menu, as described in **Table 2-4.** Pressing the softkey labeled Selected Scan Display at this time places the display into its operational mode. The new softkey menu that comes up redefines the function of softkeys K1 through K5, as listed in **Table 2-6.**

Table 2-6. Selected Scan Display Operational Softkey Menu

K1	EDIT OR SELECT SCAN	Places the Selected Scan Display into the EDIT mode. This mode is used to select a new scan number or edit parameter entries on the current display.
K2	EXECUTE SELECTED SCAN	Directs all of the parameters that are present on the current Selected Scan Display to the receiver indicated in the front panel RECEIVER/TRACE window and sends the command to start the scan.
K3	PAUSE OR CONTINUE SCAN	Permits a scan that is in progress to be halted temporarily and restarted at the point where the pause was initiated. When in the pause mode, pressing K3 will restart the scan.
K4	STOP SCAN	Stops the scan in progress and places the selected receiver into its full manual mode of operation. When the scan is stopped with this key, it may not be restarted with the PAUSE OR CONTINUE SCAN key. The EXECUTE SELECTED SCAN key must be used to initiate a new scan.
K5	RETURN	Removes the SELECTED SCAN DISPLAY from its operational mode and returns the softkey menu to the display selection mode.

2.3.3.4.1 **Edit or Select Scan (K1)** — Pressing the EDIT OR SELECT SCAN key (K1) places the Selected Scan Display into the Edit/Select Scan mode. This mode permits an operator to call up any of the thirty possible scan presets to the CRT and edit or execute the displayed scan parameters. When this mode is entered into, a reverse video cursor appears on the first parameter field (SCAN NUMBER) and instructions for editing appear across the bottom of the display. The softkey menu redefines the functions of K1, K2 and K5 to move the cursor backward to a previous parameter field (PREVIOUS PARAM.< K1 >), forward to the next parameter field (NEXT PARAM. <K2 >) or to exit the Edit/Select Scan mode (CONCLUDE EDIT < K5 >). Selection of a previously programmed Scan Number, or set up of a new set of parameters, is performed while in the edit mode, as follows:

> **SCAN NUMBER:** — The Scan Number field contains the number of the scan memory channel that is currently called to the display. When the edit mode is entered, the reverse video cursor appears in this field to select the desired scan memory channel. In this mode, any memory channel in its 1 to 30 range may be selected from the keypad. The remaining fields of this display reflect the parameters stored in the seleted channel. If no changes are required in the selected channel, the CONCLUDE EDIT key (K5) is then pressed to return to the operational softkey menu.
>
> **START:/STOP:** — The Start and Stop fields contain the start and stop frequencies for the scan. When updating these two fields, the frequency contained in the STOP must be greater than that of the Start field. These fields should be reviewed prior to executing a scan to be sure that the

parameters do not exceed the capabilities of the intended receiver. Entries into these fields are performed by entering the desired frequency (in MHz), via the keypad. The entry is completed with the keypad ENTER key.

INCREMENT: — This field contains the size of the frequency increments that will be taken during the scan operation. If the intended receiver is a WJ-8615 or WJ-8615D Receiver, this value will determine the actual size of the frequency increments taken. The increment is selectable in 5 kHz increments from 10 kHz to 5000 kHz. For WJ-8617B, WJ-8618B or WJ-8619 Receivers, this value determines if the increments will be in full or half bandwidth steps. Values equal to or greater than the selected bandwidth cause full bandwidth steps to be taken. Otherwise, half bandwidth steps will be taken.

BW: — This field contains the value (in kHz) of the receiver IF bandwidth that will be active during the scan. If the intended receiver does not support the bandwidth that is entered into this field, it will select the closest bandwidth available that is greater than the selected value. If no receiver bandwidth is equal to or greater than this value, the widest receiver bandwidth will be activated.

COR: — The COR field contains the Carrier-Operated-Relay threshold level that will be sent to the receiver for use in the scan operation. Entries in the range of 0 to 80 may be entered into this field, via the keypad, to set threshold at which the receiver recognizes signal activity as a valid contact. A value of 81 will cause the word "off" to be displayed in this field. The value in this field should not exceed the COR range of the intended destination receiver, as exceeding this range will prevent the receiver from stopping on any signal activity. When setting this field, a value should be selected that will cause the COR circuit to deactivate when no signal is present and activate in the presence of signal activity.

DET: — The DET field contains the detection mode that will be used during the scan operation. Editing this parameter is performed using the keypad INC and DEC keys to step through a list of possible entries. The selection choices for this field are: am, fm, cw, pls, lsb, usb, or isb.

AGC: — The AGC field selects the receiver gain control mode that will be active during the scan operation. When the edit cursor is in this field, pressing the INC key on the keypad enters the word "on" into the field and selects automatic gain control. Pressing the DEC key enters the word "off" into the field and selects manual gain control.

AFC: — The entry in this field determines if the receiver's automatic frequency control will be activated (on) or deactivated (off). This parameter is turned on or off using the INC and DEC keys of the keypad. When AFC is on, the receiver will attempt to center any signal contact in excess of its programmed COR threshold in its IF bandwidth, prior to any further signal processing, except in queue scan, in which no AFC action is taken.

RFG: — This display field accepts a value in a range from 0 to 255 to determine the receiver's manual gain setting. This value affects receiver operation only when the AGC field is set to off. The entry in this field is selected by directly entering the desired value at the keypad, or by using the INC and DEC keys to increase or decrease the selected value. A value of 0 indicates minimum gain and 255 indicates maximum gain.

BFO: — The BFO display field contains the offset frequency that will be sent to the selected receiver for tuning of the receiver's Beat-Frequency-Oscillator during the scan operation. This field accepts direct keypad entries ranging between +9.99 kHz and -9.99 kHz. Frequency entries that are preceeded with the +/- key will result in negative offsets. Entries that are not preceeded with the +/- key will produce positive offsets.

DWL: — The Dwell field accepts an entry in the range from 0 to 255 to determine the amount of time that the scanning receiver pauses between increments of the scan. A value of 0 in this field selects a minimum dwell period, while 255 selects the maximum dwell. Selection of this parameter is entered at the keypad by direct entry of the desired value, or the INC and DEC keys may be used to increase or decrease the value in the field. The Dwell field is only used for WJ-8617B, WJ-8618B and WJ-8619 receivers.

SCAN MODE: — The Scan Mode field contains the selection of the type scan that will be performed when the scan is executed. Scan mode selection is performed using the keypad INC and DEC keys to step through the available choices as follows:

> **free** — The free scan mode causes the receiver to stop on signal activity that is in excess of the programmed COR threshold. The receiver will remain locked on the signal until the signal level falls below this threshold, or until the operator commands it to continue.
>
> **hold** — In the hold mode, the scanning receiver locks onto signal activity in excess of programmed COR threshold and remains at the frequency until commanded to continue. Loss of signal in this mode will not cause the receiver to continue scanning.
>
> **queue** — In the queue mode, the scanning receiver stops momentarily to report the frequency of each signal contact to the controller and then continues the scan operation. Each contact that is reported to the controller is stored into a circular queue, which will store the frequency and time of contact of the most recent fifty signal contacts. The contents of the queue may be extracted by an external computer via the IEEE-488 Remote Interface. This mode is only compatible with WJ-8615 and WJ-8615D receivers and uses the queue mode in the receiver.

The remaining fields of the Selected Scan Display accept entires that are associated with automatic handoffs of signals acquired during the scan. When this feature is activated, the scanning receiver passes signal contacts off to the first available receiver in an operator designated group, contained in the HANDOFF LIST field. If an available receiver is found, the frequency and the detection mode will be handed off. If no receiver is found, the signal is lost. The handoff receiver then remains at the handed off frequency until no further signal activity, in excess of the handoff receiver's COR threshold, is present. Once the signal releases the receiver, it is again available to accept another handoff.

HANDOFF MODE: — The entry in this field determines if the auto-handoff feature will be active or disabled when the scan is executed. Pressing the INC key on the keypad enables the auto-handoff feature and places the word "auto" into this field. The DEC key disables this feature and displays the word "off".

When a signal is found by a scanning receiver that has the handoff mode set to auto, the following occurs:

1. With AFC off, all signal activity within the selected IF bandwidth, centered about a previously handed off frequency, will be considered covered by that handoff receiver. If the signal does not fall within the bandwidth, this new contact will be handed off to the next available handoff receiver.
2. With AFC on, all signal activity within +/- one full bandwidth of a previously handed off frequency, will be considered covered by that handoff receiver. If the signal does not fall within the bandwidth, this new contact will be handed off to the next available handoff receiver.

RELEASE TIME: — The Release Time field delays the release of a handoff receiver after the signal activity falls below the receiver's COR threshold. This feature accommodates short duration, intermittent type transmissions, common in a communications environment.

Once the signals falls below the COR threshold level, the receiver will continue to monitor the handed off frequency until the release time entered in this field has expired. If the signal returns before release time expiration, the handoff receiver will continue its monitoring task.

This field will accept release time entires ranging from 0 to 999 seconds. This value may be directly entered at the keypad, or the INC and DEC keys may be used to increase or decrease an existing value in the field. A value of 0, entered into this field, will cause the receiver to immediately release as soon as the signal falls below the COR threshold. Increasing the value above 999 or decreasing the value below 0 displays the word "off" in the Release Time field. When "off" is displayed, the receiver will be set to local and will remain locked at the handoff frequency, regardless of the signal status, until the handoff receiver is restored to remote.

HANDOFF LIST: — The Handoff List field is a ten entry field that will accommodate a list of up to ten receiver stations. The order of entry determines the receiver's handoff priority, with the first entry having the highest priority. When editing this field, softkeys K1 and K2 move the cursor laterally to any of the entry positions in the list. Directly entering the receiver station number at the keypad places the entered number into the list. Placing the cursor over one of the commas that separate the list entries, and pressing the INC key on the keypad, opens up a position within the list (immediately following the comma) to insert a number without disturbing any previously entered number. Otherwise, the entry will overwrite the value at that position. To remove a receiver from the list, place the cursor over the comma directly to the left of the number to be deleted and press the DEC key on the keypad. The number following the cursor will be deleted and all entries that follow will move up one position to fill in the list.

When utilizing the auto-handoff feature of the Selected Scan Display, the following precautions must be observed when creating the handoff list:

1. Each receiver in the handoff list must be a handoff (hndf) type receiver and must be in the remote mode of operation.
2. The COR level must be set above the ambient noise level to assure that the noise level does not cause the COR threshold to be exceeded. Care must also be taken when setting the COR threshold to be sure that the handed off signal **will** cause the threshold to be exceeded.
3. The bandwidth of the handoff receiver should be selected equal to or wider than the bandwidth of the scanning receiver.
4. The handoff receiver must not be tuned to an active signal that exceeds its COR threshold. Otherwise, the receiver will not release to accept a handoff.

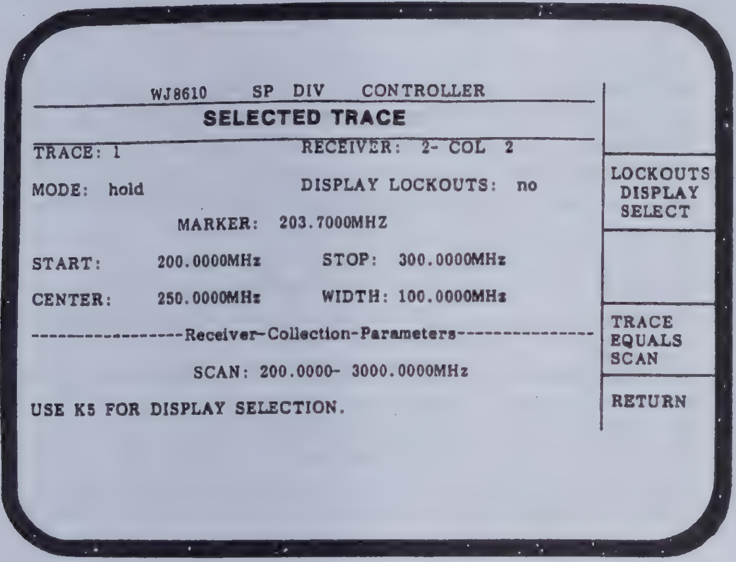
2.3.3.4.2 **Execute Selected Scan (K2)** — Once the proper scan parameters have been set up in the Selected Scan Display, the Execute Selected Scan softkey (K2) is used to transfer the parameters to the selected receiver and start the scan operation. Selection of the receiver station, to which the scan parameters are to be passed, is performed by directing keypad control to receiver selection using the RCVR/TRACE key (**paragraph 2.3.2.8**), and making the selection via the keypad. Pressing the Execute Selected Scan key (K2) then directs the parameters to the receiver station displayed in the RCVR/TRACE window of the digital display. All parameters associated with the selected scan are passed to the selected receiver and are stored in the first two memory channels in the receiver. After the scan has been executed, the scanning receiver no longer refers to this display to obtain data. Therefore, any editing of the display will have no effect on a scan that is in progress, unless the Execute Selected Scan key is again pressed.

When a scan is initiated from this display, the controller will set the configuration (CFG) register in the selected receiver to the appropriate setting for the type of scan mode that has been chosen. Any other configuration options that may have been previously selected by a remote computer will be cleared. The configuration register settings for each of the scan modes are illustrated in **Table 2-9.**

2.3.3.4.3 **Pause or Continue Scan (K3)** — The Pause or Continue Scan softkey is used to temporarily stop a scan that is in progress then restart the scan at the point where the pause occurred. Pressing this key places the scanning receiver into the scan continue mode, temporarily stopping the scan to allow manual control of the receiver. Pressing K3 a second time restarts the scan using the original scan parameters that were sent to the receiver at the time the scan was initially executed.

2.3.3.4.4 **Scan Stop (K4)** — The Scan Stop key is used to permanently stop a scan and place the receiver into full manual operation. If the scan is stopped by this key, it can only be restarted with the Execute Selected Scan key (K2).

2.3.3.5 Selected Trace Display — The Selected Trace Display, illustrated in **Figure 2-9**, is one of two displays associated with the spectrum traces that may be displayed on an external monitor. Primarily, this display is a tabular listing of the parameters that are associated with each of the six available traces.



```
              WJ8610    SP  DIV    CONTROLLER
                     SELECTED TRACE
TRACE: 1                       RECEIVER:  2- COL  2
MODE:  hold                    DISPLAY LOCKOUTS:  no
                 MARKER:  203.7000MHZ
START:        200.0000MHz        STOP:   300.0000MHz
CENTER:       250.0000MHz        WIDTH: 100.0000MHz
----------------Receiver-Collection-Parameters---------------
                  SCAN: 200.0000- 3000.0000MHz
USE K5 FOR DISPLAY SELECTION.
```

Figure 2-9. Selected Trace Display

When this display is first called up to the Controller front panel, it is displayed with the softkey menu in the display select mode. Pressing the Selected Trace Display softkey (K1) a second time places this display into its control mode and redefines the softkey menu. Once in the control mode, the softkey menu changes to the functions of: LOCKOUTS DISPLAY SELECT; TRACE EQUALS SCAN; and RETURN for softkeys K2, K4, and K5, respectively. All other fields of this display reflect selections made from the front panel controls when the panel is in the trace mode. Any trace related functions that are performed at the front panel, update the appropriate field in Selected Trace Display. These changes are inserted into the appropriate field, regardless of whether or not the display is called to the front panel CRT. The fields associated with this display and their functions are as follows:

> **TRACE:** — The Trace field indicates the number of the trace that is currently called up to the Selected Trace Display. This is also the selected trace that will be under active front panel control when the front panel is in the trace mode of operation. The number in this field (1-6) matches the T1 through T6 value that is displayed in the RCVR/TRACE window of the digital display. Directing keypad control to trace selection (by pressing the RCVR/TRACE key as required to produce a number in the RCVR/TRACE window that is preceeded by the letter T) permits any of the six Selected Trace Displays to be called to the CRT, via the keypad.

RECEIVER: — The Receiver field displays the receiver station number and the label of the receiver that has been assigned to the Selected Trace. The entry in this field is the result of the configuration of the traces as performed in the Trace Configuration Table (see **paragraph 2.3.3.6**).

MODE: — The Mode field contains the currently active trace mode for the selected trace. Entries in this field are updated any time the controller front panel is in the trace control mode and new trace mode is chosen via the IF Bandwidth Control/Trace Mode keys on the front panel. The entry in this field will be the same mode that is etched in red on the illuminated Trace Mode key.

> **off:** — The word "off" is contained in this field when the BW1/OFF trace mode control key is illuminated. In this mode, the selected trace is blanked at the external monitor and only the label field for that trace is present. The word "off" is also present in that label field on the monitor, indicating that the OFF trace mode is chosen.
>
> **hold:** — The word "hold" is contained in this field when the BW2/HOLD key is illuminated. In this trace control mode, all updating of the selected trace ceases and the trace on the external monitor reflects the last signal data provided by the assigned scanning receiver, before the hold mode was selected. On the external monitor, the label field of the selected trace also displays the word "hold" to indicate the active trace mode. When the hold mode is active, any changes in the start, stop, center or width fields of the Selected Trace Display will cause the held trace to be updated with new signal data obtained from the assigned scanning receiver.
>
> **real:** — The word "real" is contained in this field when the BW3/REAL key is illuminated. In this trace control mode, the selected trace is placed into the REAL time mode. This trace mode provides a continuously updated trace, resulting from signal data obtained from each scan of the designated receiver.
>
> **peak:** — The word "peak" is contained in this field when the BW4/PEAK trace mode control key is illuminated. In this mode, the selected trace is placed into the PEAK mode. In this mode, the display will be continuously updated by the receiver scan and will also retain the peak amplitude of all previously encountered signals. This mode is designed to provide a history of the signal activity contained in the display spectrum.
>
> **decay:** — The word "decay" is contained in this field when the BW5/DECAY key is illuminated. In this trace control mode, the selected trace is placed into the DECAY mode. In this mode, the selected trace will temporarily retain the trace data for lost signals and cause the trace response for that signal to slowly decay from the trace. This mode is intended to simplify recognition of short duration signals.

DISPLAY LOCKOUTS: — The entry in this field determines if signal activity that is within a locked out frequency spectrum (which has been previously programmed into the assigned receiver's memory) will or will not be displayed on the selected trace. If "no" is entered into this field, all locked out frequencies will be displayed on the trace as a negative going deflection, slightly below the noise level of the trace. With "yes" displayed in this field, signal activity in the locked out spectrum will be displayed in the same manner as all other activity. Changes in this field are performed by pressing the Lockouts Display Select softkey (K2), when the softkey menu is in the control mode. Each press of this key switches the entry between "on" and "off".

MARKER: — The Marker field displays the frequency positioning of an intensified marker on the selected trace. The entry in this field and the positioning of the marker on the selected trace are performed when the controller panel is in the trace control mode. Pressing the AM/MARKER key on the front panel directs frequency control to the marker positioning. The tuning wheel may then be used to move the marker. The marker frequency may be entered via the keypad by pressing the FRQ keypad control button while the front panel is in the trace control mode and the AM/MARKER key is illuminated.

START: — The Start field indicates the frequency point at which the selected trace begins displaying the signal activity that is being provided by the scanning receiver. Initial execution of a scan at the assigned receiver sets this value to the start frequency of the scan. However, changes in the start, width or center frequency parameters of the trace will cause this field to be updated to reflect the actual start frequency of the trace.

In general, changes in this field occur when the controller front panel is in the trace control mode. Pressing the FM/START trace control key places this field value under tuning wheel control (and under keypad control when the keypad control is directed to frequency selection). The value in this field may be set to any frequency within the scanning range of the assigned scanning receiver, as long as it does not exceed the start and stop frequency parameters of the receiver's scan. Changes in a related trace parameter, such as changes in the trace center frequency or width, also cause updates in the start frequency field to maintain a consistent relationship between all of the trace frequency parameters.

STOP: — The Stop field indicates the frequency point at which the selected trace ends its display of the signal that is being provided by the scanning receiver. Initial execution of the scan sets this value to the programmed stop frequency of the scan. However, changes in the stop, width or center frequency parameters of the trace will cause this field to be updated to reflect the actual stop frequency of the trace.

Changes in this field occur when the controller front panel is in the trace control mode. Pressing the CW/STOP trace control key places this field under tuning wheel control (and under keypad control when the keypad control is directed to frequency selection). The value in this field may be set to any frequency within the scanning range of the assigned scanning receiver, as long as the value does not exceed the start and stop frequency parameters of the receiver's scan. Changes in related trace parameters, such as changes in the trace center frequency or width, also cause updates in the stop field to maintain a consistent relationship between all of the trace frequency parameters.

CENTER: — The Center field displays the center frequency of the trace. The value displayed in this field will always indicate the midpoint between the frequencies displayed in the start and stop fields of the display. Any time the start or stop parameters for the selected trace are changed, the Center field is automatically updated to maintain the proper center frequency of the trace. Conversely, changes in the Center field force updates of the start and stop fields to maintain the proper frequency relationships.

Changes in this field are performed when the controller front panel is in the trace control mode and the PLS/CENTER key is active. At this time, the Center parameter is under tuning wheel control (and under keypad control when the keypad is directed to frequency control). The value in this field may be set to any frequency within the scanning range of the assigned receiver, as long as neither the start nor stop field frequency values exceed the start and stop frequencies of the scan that is in progress.

WIDTH: — The Width field contains the frequency width of the selected trace. The value in this field is always equal to the difference between the frequencies in the stop and start fields. Any changes in the start or stop fields of the selected trace, cause the value in this field to be updated to display the actual trace width. Conversely, changes in the width field cause both the start and stop field values to be updated to maintain the proper relationship between the parameters in these fields.

Direct changes in the width parameter are performed when the controller front panel is in the trace control mode and the SSB/WIDTH key is selected. At this time, the width field is under tuning wheel control (and under keypad control when the keypad is directed to frequency control). Increasing the width parameter widens the portion of the scan spectrum that is displayed on the selected trace. Decreasing the width parameter decreases the width of the scan spectrum that is displayed on the trace, thus increasing the resolution of the trace. The width adjustment may be adjusted down to display as few as ten scan increments or up to display the full spectrum of the scan, as long as neither the start field nor the stop field values exceed the start and stop frequencies of the scan that is in progress.

SCAN: — The Scan field contains the start and stop frequency of the scan that is in progress at the assigned receiver. The frequency range is inserted when a scan is executed from the Selected Scan Display and reflects the start and stop frequency parameters that were last sent to the assigned receiver.

2.3.3.5.1 **Lockouts Display Select (K2)** — When the Selected Trace Display is in the control mode, the softkey menu assigns the function of softkey K2 as Lockouts Display Select. This key controls the entry of the display in the Display Lockouts field to determine if signal activity in a locked out frequency spectrum is or is not to be displayed on the selected trace. Each press of K2 switches the entry in the Display Lockouts field between yes and no. **Figure 2-10** illustrates a six trace display, as viewed on an external monitor. The top two traces are each set to identical trace parameters, except that the Display Lockouts field of trace 1 is set to "yes", while this field is set to "no" for trace 2. As illustrated, trace 2 distinctively identifies portions of the scanning spectrum that are locked out, while trace 1 displays this signal activity, even though the scanning receiver does not recognize the locked out spectrum as having valid signals.

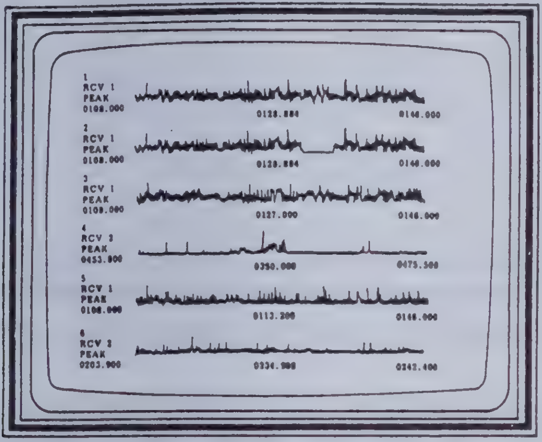


Figure 2-10. Six Trace External Monitor Display

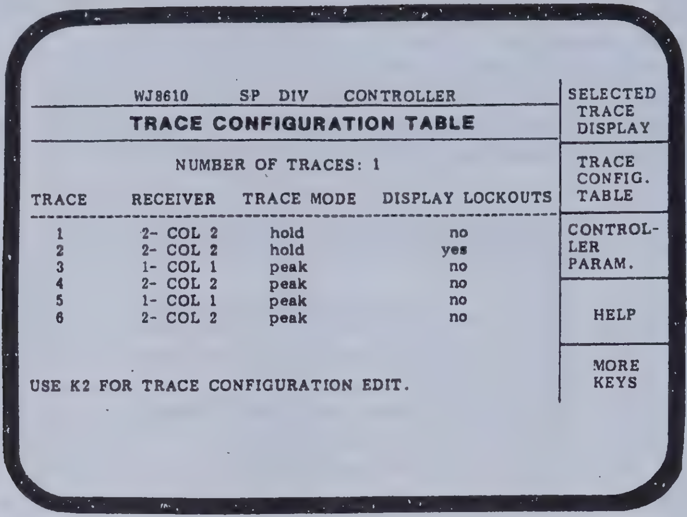
2.3.3.5.2 **Trace Equals Scan (K4)** — The Trace Equals Scan softkey is used to restore all of the frequency parameters, of the selected trace, back to the values that were present when the scan was first executed. When this key is pressed, the Start and Stop fields are set to the start and stop frequencies of the scan, thus, forcing the trace to display the entire spectrum of the scan that is in progress. The Center field is set to the midpoint between the start and stop frequencies, and the Width field is set to the width of the scan [Width = F(stop) - F(start)].

2.3.3.5.3 **Return (K5)** — The Return key disables the Selected Trace Display control mode and returns the display select softkey menu to the CRT.

2.3.3.6 **Trace Configuration Table** — The Trace Configuration Table is a control table used to develop the configuration of the traces for viewing on the external monitor. From this display, the number of traces to be viewed on the monitor is selected and the assignment of a specific receiver to each of the traces is performed. When this display is first called to the controller's CRT, it is displayed with the softkey menu in the display select mode as illustrated in **Figure 2-11**. In this mode, the configuration of each trace, and the number of traces that will be displayed, are listed in tabular form for easy viewing.

When this display is present on the controller CRT, pressing the Trace Config. Table softkey (K2) two additional times places the Trace Configuration Table into the Edit mode. Once in the Edit mode, softkeys K1 and K2 are assigned as PREVIOUS PARAM. and

NEXT PARAM., respectively, to move the cursor to the appropriate field for updating. Softkey K5 (CONCLUDE EDIT) is used to exit the edit mode when the update is complete. As the cursor is moved to each field, the instruction window at the bottom of the display provides helpful instructions to aid in updating the selected field.



WJ8610 SP DIV CONTROLLER

TRACE CONFIGURATION TABLE

NUMBER OF TRACES: 1

TRACE	RECEIVER	TRACE MODE	DISPLAY LOCKOUTS
1	2- COL 2	hold	no
2	2- COL 2	hold	yes
3	1- COL 1	peak	no
4	2- COL 2	peak	no
5	1- COL 1	peak	no
6	2- COL 2	peak	no

USE K2 FOR TRACE CONFIGURATION EDIT.

Figure 2-11. Trace Configuration Table

2.3.3.6.1 Edit **Trace Configuration** — Only two categories of display fields require that the display be in the edit mode for updating. These fields are the NUMBER OF TRACES, and the six fields of the RECEIVER column. It is through these fields that the actual trace configuration is performed. The remaining three field categories are either fixed, or have their entries modified by operations that are independent of the Trace Configuration Table display. The functions that are associated with these display fields are as follows:

> **NUMBER OF TRACES:** — The Number of Traces field determines the number of traces that will be displayed on the external monitor. Changes in this field may be performed when the Trace Configuration Table is in the edit mode. Any number ranging from 0 to 6 may be entered in this field from the keypad, either by directly entering the number (followed by pressing the ENTER key) or by using the INC and DEC keys to increase or decrease the value in this field. Entering a number between 1 and 6, displays that number of traces on the external monitor, starting with trace and continuing up to the number entered in the field. For each number of traces selected, the controller will adjust the vertical placement of the traces on the monitor to fully utilize the available space of the CRT. The actual amplitude of the spectrum traces will also be adjusted to take full advantage of the available space.
>
> Entering a value of 0 in this field removes all traces from the external monitor and displays a test pattern. This test pattern, illustrated in **Figure 2-12**, assists in both the adjustment of the controller output levels and also in the adjustment of the external monitor's controls for the optimum display.

TRACE: — The Trace column contains a fixed numerical list to identify each of the six traces. No changes are possible in these fields.

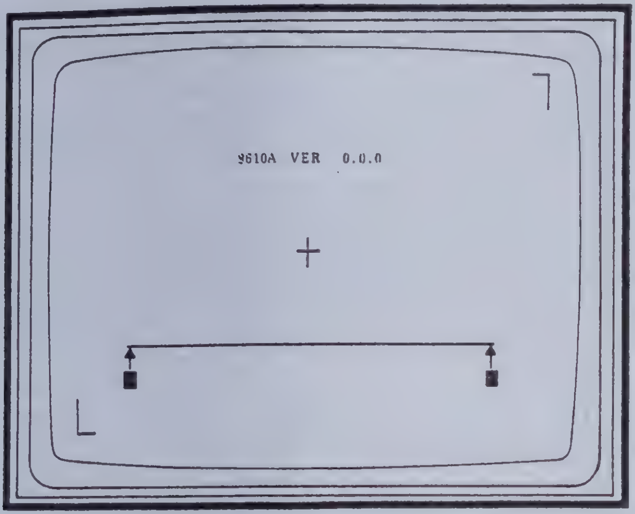


Figure 2-12. External Monitor Test Pattern

RECEIVER: — The Receiver column contains a field for each trace and is used to assign a receiver to the trace. Entries in these fields are performed by placing the Trace Configuration Table into the edit mode and moving the cursor to the field associated with the desired trace number. Entering the station number of the receiver, via the keypad, places the receiver number and the label for that receiver into the selected field and assigns that receiver to the trace. Only receiver stations 1 through 4 may be assigned to traces, as only these stations have the capability of producing spectrum traces. However, any of these receivers may be assigned to more than one trace to permit independent viewing of different portions of the scan spectrum simultaneously.

TRACE MODE: — The Trace Mode column displays the last selected trace mode for each of the six traces (off, hold, real, peak, decay). Entries in these fields are independent of the Trace Configuration Table. These entries are updated by the front panel IF Bandwidth Control/Trace Mode keys when the controller front panel is in the trace control mode of operation.

DISPLAY LOCKOUTS: — The Display Lockouts column indicates whether or not locked out signals will be displayed on the trace. An entry of "yes" in the Display Lockouts field indicates that the associated trace will display locked out frequencies in the same manner as normal signal activity. With an entry of "no" in the field, no locked out signal activity will show on the trace. The entries in these fields are independent of the Trace Configuration Table. They reflect the display lockouts selection chosen in the Selected Trace Display (**paragraph 2.3.3.5.1**).

2.3.3.6.2 **External Monitor Trace Display** — The display information provided to the external monitor via the controller's X, Y, and Z outputs provide deflection and intensity signals to develop either the desired spectrum display traces or a test pattern. With the Number of Traces field of the Controller's Trace Configuration Table set to 0, a test pattern is displayed on the external monitor, as illustrated in **Figure 2-12**. This display assists in setting the external monitor for proper display placement and also checks the alignment of the controller's circuitry.

Corner markers on the test pattern provide a reference for the lower left-hand and upper right-hand corners of the display area to permit proper horizontal and vertical positioning of the monitor's display. The cross at the center of the display verifies the proper convergence of the controller's horizontal (x) axis. If properly aligned, the vertical axis of the cross appears as the straight vertical line. Any convergence misalignment causes the vertical axis of the cross to shift, causing a horiztonal offset between the segment of the vertical axis that is above the intersection of the cross and the segment below the intersection. The line directly below the center cross is provided to check for proper adjustment of the spectrum traces' width. With proper trace width alignment, the horizontal line should trace between the tips of the two up-pointing arrows. The final portion of the test pattern checks the character generator circuitry of the controller. This line of characters identifies the controller and version of trace software contained in the unit. This version display is not related to the version display that is flashed on the controller front panel at power up, and will typically differ in version number.

When the Number of Traces is set to 1 or more, the external monitor will display the chosen number of spectrum traces and the associated identifying labels. **Figure 2-13** illustrates a display containing six traces. However, depending on the number of traces chosen, the display may contain any number of traces, from 1 to 6.

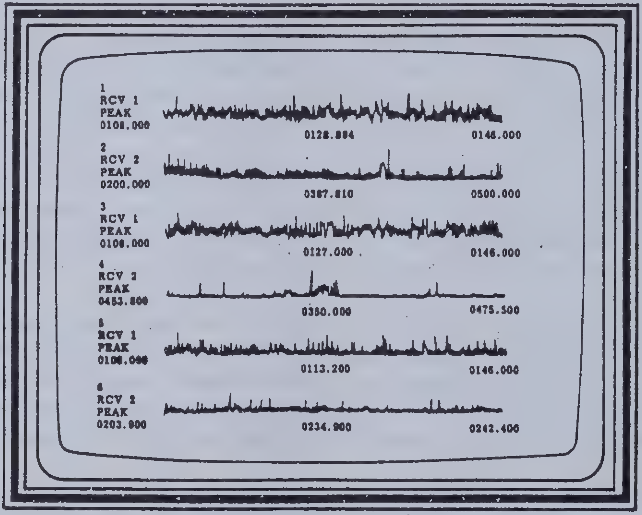


Figure 2-13. External Monitor Trace Display

The trace label field, directly to the left of each trace, provides identification data for its adjacent trace. With from 1 to 5 traces selected, each trace label field consists of four entry lines to identify: trace number; assigned receiver station; label of the assigned receiver;

and the selected trace mode. With six traces selected, due to vertical space restrictions, the trace label field is composed of three entry lines. In this instance, the receiver label is omitted from the display.

1 - 5 Trace label field:

1	Trace Number
RCV 1	Assigned Receiver Station
COL-1	Assigned Receiver Label
HOLD	Selected Trace Mode

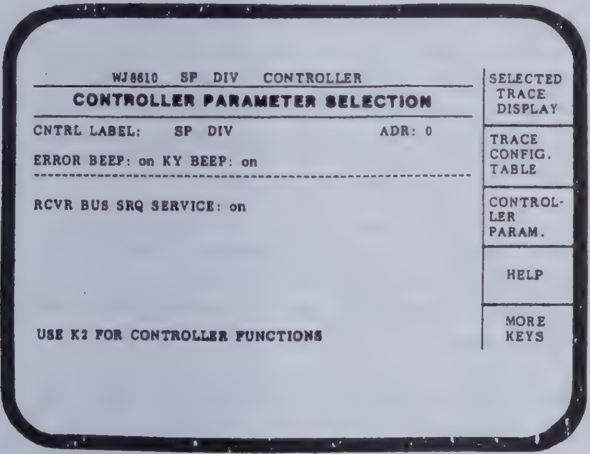
6 Trace label field:

1	Trace Number
RCV 1	Assigned Receiver Station
HOLD	Selected Trace Mode

Directly below the trace label field is a seven character start frequency field which identifies the frequency point at which the trace coverage of the scan begins. To the far right of each trace, another seven character field identifies the frequency point at which the trace ends. At the center of the display, directly below each trace, a third seven character field indicates the frequency position on the trace of the intensified marker. This marker and its corresponding marker frequency field are useful in identifying the actual frequency of individual signals within the trace coverage.

The traces on the external monitor are updated only when the assigned receiver is scanning. If the scan in halted, the trace that is associated with the receiver displays the signal activity that was obtained during the last scan cycle. The word "IDLE" is displayed directly above the center of any trace that is displaying a spectrum obtained from a receiver that is no longer scanning. This identifier notifies a viewer that the trace contains digitally refreshed data obtained from the controller's memory, not a real-time spectrum display.

2.3.3.7 **Controller Parameter Display**. From page two of the softkey display select menu, pressing the Controller Param. softkey (K3) calls the Controller Parameter Selection display to the front panel CRT. This display permits viewing or changing some of the basic operating parameters of the WJ-8610A-1 Controller. When this display is first called to the controller's CRT display, it comes up with the softkey menu set in the display select mode, as illustrated in **Figure 2-14**. Pressing K3 a second time places this display into its operational mode and redefines the softkey menu to the control functions associated with this display.



```
WJ8610 SP DIV CONTROLLER
CONTROLLER PARAMETER SELECTION
CNTRL LABEL:   SP DIV                    ADR: 0
ERROR BEEP: on KY BEEP: on
------------------------------------------------------------
RCVR BUS SRQ SERVICE: on



USE K2 FOR CONTROLLER FUNCTIONS
```

Figure 2-14. Controller Parameter Display

2.3.3.7.1 **Edit Control Param. (K1).** The Edit Control Param. softkey permits access to the display fields for editing. When this key is pressed, the display enters into the edit mode. A reverse field cursor appears in the first parameter field (CNTRL LABEL), and the softkey menu redefines the function of K1, K2 and K5 to move the cursor backward to the previous parameter field (PREVIOUS PARAM. <K1>), forward to the next field (NEXT PARAM. <K2>) or to exit the edit mode (CONCLUDE EDIT <K5>). From this edit mode, four of the five display fields may be updated from the controller front panel. The fifth entry (RCVR BUS SRQ SERVICE:) is constantly under the control of the controller's operating system and cannot be accessed from the edit mode. The fields in this display and their functions are as follows:

CNTRL LABEL: The Controller Label contains a six character alphanumeric label which is assigned by the user for controller identification. When the cursor is in this field, a label containing up to six characters may be entered by pressing the appropriate key for the desired character, as listed in **paragraph 2.3.2.18.** Once the label selection is complete, press ENTER on the keypad to complete the label entry. The assigned controller label will be present at the top of each of the controller displays.

ADR: The address field contains the controller's remote address on the Remote Control Bus (J2). This entry will only affect the address that is used by an external device to communicate with the controller. The address that is used by the controller to communicate with the system receivers via the Remote Control Port (J2), is fixed by the operating system and cannot be changed.

The address field may be changed to any address from 0 to 30 by either directly entering the desired value at the keypad (followed by ENTER), or by increasing or decreasing the displayed value, using the INC or DEC keys. Once a new address is selected, it will be retained in battery backed-up memory and remain, even if power is removed from the system. If an address change is to be permanent, it is recommended that the change be performed by setting the dip switches on the Remote Interface, rather than by using this field entry. (See **paragraph 2.2,** Installation).

ERROR BEEP: The Error Beep field controls an audio tone that sounds when an error occurs or an illegal entry is attempted. This tone is switched on or off by using the INC and DEC keys of the keypad. The INC key places the word "on" into this field and activates the audible error tone. The DEC key places the word "off" into this field and disables the error tone.

KY BEEP: The Key Beep field controls an audio tone that is activated each time a front panel key is pressed. This feature is selected using the keypad INC key to place the word "on" into the Ky Beep field and activate the audible tone. The DEC key of the keypad places the word "off" into this field and disables the audio tone.

RCVR BUS SRQ SERVICE: The Rcvr Bus SRQ Service field is an information field and cannot be changed in the edit mode. This field provides an indication of the operating status of the controller on the receiver control bus. During normal operation, the word "on" is displayed in this field, indicating the controller is properly handling receiver service requests. When a condition exists where the controller cannot recognize the receiver that is requesting service, it places the word "off" into this field and halts the handling of receiver service requests. In most instances, only service request handling is affected and limited receiver control is still possible.

The most common condition that causes the SRQ handling to be turned off is improper receiver assignment on the receiver bus. Adding a new receiver, with an address that is not assigned to a receiver station, prevents proper Service Request handling, thus, forcing the controller to halt the handling of all service requests. This condition may be remedied by removing the improperly configured receiver or by manually entering the address of the new receiver into an unoccupied receiver station. (See Selected Receiver Display, **paragraph 2.3.3.2**).

2.3.3.7.2 **Init Control Bus (K2).** The Init Control Bus softkey provides a means of clearing and reinitializing the receiver control bus if a lock up of the bus should occur. Under normal bus operating conditions, pressing this softkey will have no visable effects.

2.3.3.7.3 **Find and Learn Rcvrs (K3).** The Find and Learn Rcvrs softkey causes the controller to sequentially search through every valid receiver address on the bus and query each receiver that is found for its operating parameters and capabilities. All of the receivers found will be reassigned to the receiver stations in address order, starting with the lowest address at receiver station number one. Receiver configuration changes that were manually entered, via the Selected Receiver Display, prior to pressing the Find and Learn Rcvrs softkey will be lost and will have to be reentered.

2.3.3.7.4 **Learn Active Rcvrs (K4).** The Learn Active Rcvrs softkey functions similar to the Find and Learn Rcvrs softkey, except that the controller queries the receiver addresses that are assigned to receiver stations. When this function is activated, the controller addresses the receiver assigned to each receiver station and queries the receiver for its operating parameters and capabilities. This address order of the receiver stations is not disturbed and any user assigned receiver labels remain intact.

2.3.3.7.5 **Return (K5).** The Return key removes the Controller Parameter Display from its operational mode and returns the softkey menu to the display select mode.

2.4 REMOTE CONTROL

The WJ-8610A-1 Receiver Controller interfaces with an external computer or other remote controlling devices using a standard IEEE-488-1978 remote interface. This interface provides both talk and listen capabilities between the controller and external equipment, transferring data in a bit-parallel, byte-serial form. Sixteen interconnecting lines plus eight ground and shield lines form the interface. These lines consist of eight bi-directional data bus lines, three data byte transfer lines and five management lines. Data or address information is transferred between devices using the eight data bus lines. The data byte transfer lines indicate the availability and validity of the information on the data bus lines; if the listening devices are ready to accept data; and if the data has been accepted. The interface management lines specify if the data bus lines are carrying data or address information; request service; clear the interface; and indicate the end of a transfer sequence. Refer to **Figure 2-15** for the pin configuration of the standard IEEE-488 interface cable.

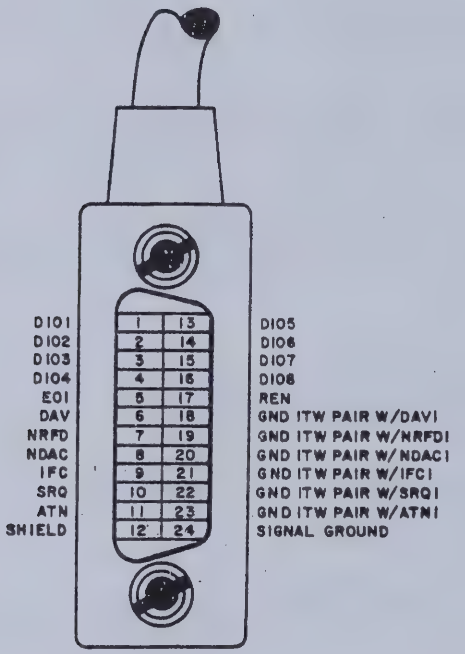

DIO1
1
13
DIO5
DIO2
2
14
DIO6
DIO3
3
15
DIO7
DIO4
4
16
DIO8
EOI
5
17
REN
DAV
6
18
GND (TW PAIR W/DAV)
NRFD
7
19
GND (TW PAIR W/NRFD)
NDAC
8
20
GND (TW PAIR W/NDAC)
IFC
9
21
GND (TW PAIR W/IFC)
SRQ
10
22
GND (TW PAIR W/SRQ)
ATN
11
23
GND (TW PAIR W/ATN)
SHIELD
12
24
SIGNAL GROUND

Figure 2-15. IEEE-488 Interface Cable Pin Configuration

As implemented in the WJ-8610A-1 Controller, the capabilities of the IEEE-488 interface include:

- SH1 Source Handshake
- AH1 Acceptor Handshake
- T6 Basic Talker With Serial Poll
- L4 Basic Listener With Serial Poll
- SR1 Service Request
- DC1 Device Clear

Essentially this means that the controller can talk or listen when commanded by the remote computer. It can also issue a service request to notify the computer when service is needed.

The WJ-8610A-1 Controller utilizies two IEEE-488 interfaces to form a communications link between the remote computer and up to fourteen additional IEEE-488 compatible devices. The first interface interconnects with the bus containing up to fourteen additional devices. Using this configuration, the computer has access to any of the devices while experiencing the bus loading of a single device. As specified by the IEEE-488 standard, no more than fifteen devices can be connected to the interface at any given time. In addition, the maximum cable length that may be used is two meters times the the number of devices on the bus or twenty meters, whichever is less. This specification must be adhered to for each interface bus to assure proper bus operation. Bus interconnection may be accomplished using either a STAR or DAISY CHAIN configuration or a combination of both configurations.

2.4.1 GENERAL DESCRIPTION

The WJ-8610A-1 Controller recognizes mnemonics associated with the WJ-861X Receiver Family, plus a number of additional commands which are specific to the Controller operation. These commands are listed in the WJ-8610A-1 Controller Table of Mnemonics, **Table 2-7.** The commands listed in the table are classified in four categories to provide maximum flexibility for remote communicaitons. All but one of these classifications, Pass Through, must be sent in an ASCII format, exactly as listed. The messages are sent as a string of ASCII data bytes, each representing one character of the command or query. Termination of the message may be indicated by CR, LF (Carriage Return, Line Feed), LF (Line Feed) or by setting EOI (End Or Identify) on the last character of the message. When a command contains a variable, the mnemonic will be followed by a number representing its value. Each digit of the number is sent as a separate ASCII character. The variables may be sent in a free field format, omitting leading and trailing zeros, or fixed field, all leading and trailing zeros included. Variables returned by the controller will be sent in a fixed format, with a specified number of bytes returned.

When a query requires a response from the WJ-8610A-1 Controller, the response will consist of the mnemonic followed by a space and then the variable data, all in an ASCII format. Depending on the type mnemonic sent, the variable data will be returned in one of four formats. In **Table 2-7**, the different variable formats are illustrated by the use of different letter designations.

The first format is used to transfer data having a range from 0 to 999. This format is used with mnemonics such as COR x or RFG x, where x is equal to a three character response. Leading zeros are not returned in this format, but are replaced with ASCII spaces (20 Hex).

Format two is used to transfer data having a range from 0 to 9999. When this format is used, the variable will consist of four characters. As with the first format, leading zeros will be sent as ASCII spaces (20 Hex). This type of variable is used with responses such as BWC y and @BWC y, where y is equal to the four character response.

The third variable format is the type used with frequency responses using the "f" variable and is illustrated in **Table 2-7.** This response is used with mnemonics such as, FRQ f. The f variable represents data ranging from 0 to 9999.9999. Data sent will consist of nine characters, four ASCII digits, followed by the ASCII equivalent of a decimal point and then the final four ASCII digits. In this format, all leading zeros except the one directly before the decimal point will be suppressed and replaced with ASCII spaces.

The final variable format that will be sent is for variables ranging from -999.9999 to +9999.9999. Variables of this type will be returned with BFO mnemonics. This type of variable is similar to that used with frequency, except that the most significant character is used to indicate polarity. To indicate a negative offset, an ASCII minus sign is sent, followed by the numerical data (three digits, decimal and then four digits). In this format leading zeros, after the minus sign, will be replaced with ASCII spaces. When positive offsets are sent, the minus sign will also be replaced with an ASCII space.

2.4.2 MESSAGE CATEGORIES

2.4.2.1 **Controller Commands** — Controller commands are used to permit the remote computer to communicate directly with the WJ-8610A-1 Controller. These commands are handled immediately after the receipt of the message terminator. The message is error checked and then processed. No further message will be accepted until the processing is complete. When using these controller commands, multiple mnemonic messages may be sent in a single message string, separated with semicolons (;). A total of up to one hundred characters, including semicolons and terminators, may be sent in a single string.

The mnemonics in this category are prefixed with a "$" and must be sent in the ASCII format. In order to use commands in this category, the Controller must be in the remote mode, or it must be first placed into remote, using a "$RMT" command. Queries are valid while in remote or local.

2.4.2.1.1 **Scan Control Commands (Remote)** — Scan Control covers entry and execution of scans using the WJ-8610A-1 Receiver Controller. The Controller allows storage of up to 30 scan set-ups. These set-ups ARE NOT UNIQUE TO ANY ONE RECEIVER and may be sent to any valid receiver. When the scan is executed the start and stop frequencies are loaded to channels 0 and 1 of the Selected receiver and the scan is started. However, for the x/y display (WJ-9201) to show scan information from the display receivers (1-4), the scan must be entered using the function ($SCN x). Receivers 1 to 4 must be hardware configured as display receivers. If the scan is entered using RECEIVER DIRECT functions, the Controller cannot create an x/y display.

When the scan is initiated, using the "$SCN x" command, the configuration register of the selected receiver will be set by the WJ-8610A-1 Controller, by ORing the required configuration bits, with the data that has been previously stored in this register, for the type of scan mode chosen. Any other configuration options that may have been previously selected by the remote computer will be unaffected, unless it conflicts with the required setting for the chosen scan mode. Any mode violations will be corrected. The Controller will permit configuration changes after the scan is initiated, however, since this could cause conflicts in the configuration register requirements for the chosen scan mode, it is recommended that unique configuration commands (CFG x) be sent prior to initiating the scan. This will permit the WJ-8610A-1 Controller to correct any conflicts that could otherwise result in unreliable scan operation.

2.4.2.2 **Front Panel Emulation Commands** — Front panel emulation commands permit the remote computer to control a selected receiver indirectly. This category of command is directed to the Controller and causes the Controller to perform the desired action on the selected receiver. As the name implies, this type command emulates WJ-8610A-1 front panel controls. When using this category of commands, the Controller first error checks the message and performs the desired action. The parameter changes are stored in the Controller's memory buffer for the selected receiver and are then sent over the receiver bus to that receiver. This command category permits multiple mnemonic messages of up to one hundred characters to be sent in a single string, separated with semicolons (;).

The mnemonics in this category are prefixed with an "@" character and must be sent in the ASCII format. In order to use these commands, the Controller must be placed in the Remote mode and the selected receiver must be selected using the appropriate controller command, ($RCV x). However, queries will be accepted and acted on in either Local or Remote. In the descriptions in **Table 2-7**, these commands are classified as the "Frnt Pnl" category and the selected receiver is the receiver that was last selected by the "$RCV x" command. Both controller commands and the front panel emulation commands may be combined in a single message string, if desired.

2.4.2.3 **Receiver Direct Commands** — Receiver direct commands permit the remote computer to communicate directly with any of the receivers on the receiver bus. When using this category of commands, the incoming data is buffered and error checked by the controller and is then placed in a circular queue FIFO (first-in-first-out) memory buffer, to be sent to the designated destination receiver as time permits. The circular queue permits the Controller to temporarily store the incoming data until it is able to transfer the information to the receiver without slowing the data flow from the computer. Should the Controller update the data before it is transferred to the receiver, the controller will update its buffers with the new information and send only the more recent data out of the receiver. Queries are permitted in this mode of operation. When a query is received, the Controller will wait until all commands on the circular queue are sent before processing the query. As with the Controller and front panel emulation command categories, this category also permits multiple mnemonic messages of up to one hundred characters to be sent, when separated with semicolons.

Receiver direct commands contain no prefix before the mnemonic. These commands will be accepted by the Controller in either Local or Remote mode and may be combined with commands from the other command categories. However, when combining categories, the controller must be in Remote before it will accept any controller or front panel emulation commands. The receiver direct commands are categorized in **Table 2-7** as the "Rec. Direct" category and the designated destination receiver is referred to as the Designated receiver. Selection of the designated receiver is accomplished by preceeding the command with a "RCV x" command.

2.4.2.4 Pass-Through Commands — Pass-through commands permit the remote computer to bypass the WJ-8610A-1 Controller to communicate directly with receivers that have been designated as "pthr" (pass-through) receivers. These commands, may not be used to communicate with any receiver that is designated other than pass-through. When this category of command is sent, the Controller functions as a bus extender, passing the message string exactly as received from the computer. No error checking is performed by the Controller, nor is any data pertaining to the destination receiver retained. This type of communication may be sent in either the ASCII or binary format, as desired. However, if ASCII is used, the receiver must first be placed in the ASCII format, as the Controller communicates with the receivers on the receiver bus in BINARY. Similarly, when the communication is completed, the computer must again replace the receiver to the binary mode to permit ready access by the Controller. Refer to the appropriate WJ-861X Receiver Manual for the Remote commands associated with the receiver.

Pass-through commands consist of the number of the destination receiver, followed by a " < " character and then the command or query to be sent to the receiver. Upon completion of the message, the string must be terminated by setting EOI as the last character sent. When using commands in this category, multiple mnemonic strings of up to ninety-eight characters (including separators), may be sent in a single string. These commands may be combined with those of other categories, as long as the pass-through commands are the last commands, in the message string. No controller, front panel emulation or receiver direct commands, may follow a pass-through command in the same string.

2.4.2.5 Queue Operation and Commands — The WJ-8610A-1 Controller accumulates a queue of signal activity, frequency and time for each active receiver including scanning display receivers. The queue is 50 channels deep and uses a FIFO approach. The remote computer may read the queue by selecting a Designated receiver, then asking the Controller for QUE? It will respond with a list of frequencies, times and activity indicators. The list will have a minimum of zero and a maximum of 50 entries. Reading the list will clear the queue for that particular receiver. The queue is double buffered so that any signals acquired, while the read is in process, will be available on the next QUE read.

The queues are automatically filled by the controller any time a receiver on the receiver bus reports signal activity, irregardless of receiver mode (i.e. scan, step, man). Receivers must be of the (fixd, mntr, ctl, hndf) types to have their queue collected. No queue operation is done for (ndef or pthr) type receivers. Receivers used in the scan queue mode of operation will have the 50 channel controller que filled from the 16 channel receiver queue.

A queue limit may be specified for each receiver to cause an SRQ upon putting a specified number of entries into the 50 channel queue. Using this option, the system computer is not required to respond each time there is signal activity. The queue limit may be specified at any number from 1 to 50 entries, greater than 50 will disable SRQ on queue limit. When a queue limit SRQ occurs, bit 7 of the serial poll status byte will be set. The queue limit SRQ must be enabled using the mask (MSK) command for the particular receiver to set bit 7.

Table 2-7. WJ-8610A-1 Controller Table of Mnemonics

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
AFC	Command	Rec. Direct		Activates AFC on the Designated RCVR
@AFC	Command	Frnt Pnl		Directs to activate AFC on Selected RCVR
AFC/	Command	Rec. Direct		Turn OFF AFC on Designated RCVR
@AFC/	Command	Frnt Pnl		Turn OFF AFC on Selected RCVR
AFC?	Query	Rec. Direct		What is status of AFC on Designated RCVR?
			AFC	AFC is ON
			AFC/	AFC is OFF
@AFC?	Query	Frnt Pnl		What is status of AFC on Selected RCVR?
			@AFC	AFC is ON
			@AFC/	AFC is OFF
AGC	Command	Rec. Direct		Activate AGC on Designated RCVR
@AGC	Command	Frnt Pnl		Activate AGC on Selected RCVR
AGC/	Command	Rec. Direct		Select Manual Gain control on Designated RCVR
@AGC/	Command	Frnt Pnl		Select Manual Gain control on Selected RCVR
AGC?	Query	Rec. Direct		What is AGC status of Designated RCVR?
			AGC	AGC is selected
			AGC/	Manual Gain Selected
@AGC?	Query	Frnt Pnl		What is AGC status of Selected RCVR?
			@AGC	AGC is activated
			@AGC/	Manual Gain Selected
AM	Command	Rec. Direct		Select AM detection on Designated RCVR
@AM	Command	Frnt Pnl		Select AM detection on Selected RCVR
AM?	Query	Rec. Direct		How much AM modulation is present on Designated RCVR?
			AM x	AM modulation = x Where x = 0 to 100
@AM?	Query	Frnt Pnl		How much AM modulation is present on Selected RCVR?
			@AM x	AM modulation = x Where x = 0 to 100

Table 2-7. WJ-8610A-1 Controller Table of Mnemonics (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
@ADR x	Command	Frnt Pnl		Set the address which the Controller uses for the Selected Receiver to x NOTE: Receiver address must match address used with @ ADR command.
@ADR?	Query	Frnt Pnl		What is the address of the Selected RCVR?
			@ADR x	The address of the Selected RCVR is x Where x = 0 to 25
BFO n	Command	Rec. Direct		Set the BFO Frequency of Designated RCVR to +/- n kHz If WJ-8615, WJ-8615D receiver in CW detection (n = +4.00 to -4.00) If WJ-8615, WJ-8615D in SSB, (n = +2.00 to -2.00) If WJ-8617B, WJ-8618B or WJ-8619 (n = +7.99 to -7.99)
@BFO n	Command	Frnt Pnl		Set the BFO Frequency of Selected RCVR to + - n kHz If WJ-8615, WJ-8615D receiver in CW detection (n = +4.00 to -4.00) If WJ-8615, WJ-8615D in SSB, (n = +2.00 to -2.00) If WJ-8617B, WJ-8618B or WJ-8619 (n = +7.99 to -7.99)
BFO?	Query	Rec. Direct		What is BFO Frequency of Designated RCVR?
			BFO n	BFO Frequency = n kHz
@BFO?	Query	Frnt Pnl		What is BFO Frequency of Designated RCVR?
			@BFO n	BFO Frequency = n kHz
BW x	Command	Rec. Direct		Select Bandwidth No. x on Selected RCVR (x = 1, 2, 3, 4, 5)
@BW x	Command	Frnt Pnl		Select Bandwidth No. x on Selected RCVR (x = 1, 2, 3, 4, 5)
BW?	Query	Rec. Direct		What BW slot is active on Designated RCVR?
			BW x	Bandwidth x is active on Designated RCVR
@BW?	Query	Frnt Pnl		What BW slot is active on Selected RCVR?
			@BW x	Bandwidth x is active on Selected RCVR
@BWC x	Command	Frnt Pnl		If x = 0, the active BW of the Selected RCVR will be locked out to prevent selection from controller front panel. If x value is other than 0. BW will be selectable. (x = 0 to 9999 kHz)

Table 2-7. **WJ-8610A-1 Controller Table of Mnemonics** (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
BWC?	Query	Rec. Direct		What is size of active BW in Designated RCVR?
			BWC y	Active BW size of Designated RCVR is: y = BW size in kHz y = 0 if BW locked out
@BWC?	Query	Frnt Pnl		What is size of active BW in Selected RCVR?
			@BWC y	Active BW size of Selected RCVR is: y = BW size in kHz y = 0 if BW is locked out
BYP	Command(1)	Rec. Direct		Bypass WJ-8615 Tracking Preselector on Designated RCVR
@BYP	Command(1)	Frnt Pnl		Bypass WJ-8615 Tracking Preselector on Selected RCVR
BYP/	Command(1)	Rec. Direct		Activate Tracking Preselector on Designated RCVR
@BYP/	Command(1)	Frnt Pnl		Activate Tracking Preselector on Selected RCVR
BYP?	Query(1)	Rec. Direct		What is status of Tracking Preselector in Designated RCVR?
			BYP	Tracking Preselector is in BYPASS mode
			BYP/	Tracking Preselector is in ACTIVE mode
@BYP?	Query(1)	Frnt Pnl		What is status of Tracking Preselector in the Selected RCVR?
			@BYP	Tracking Preselector is in BYPASS mode
			@BYP/	Tracking Preselector is in ACTIVE mode
CFG x	Command	Rec. Direct		Set receiver configuration of Designated RCVR to x, where x equals: 1 = Set SRQ on COR Status 2 = Cause AGC dump when Frequency command is received.(1) 4 = Enter continue mode from scan or step on signals found over COR.(2,3) 8 = Set SRQ on end of scan or step sequence and enter continue mode.(2,3) 16 = Queue signals found in scan or step.(2) 32 = Enter continue mode on full internal receiver queue.(2) 64 = Queue all signals over COR in scan (2). 128 = Not used

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. **WJ-8610A-1 Controller Table of Mnemonics** (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
CFG?	Query	Rec. Direct		Return current configuration status from Designated RCVR.
			CFG x	Configuration status is x (See CFG x)
CHN	Command(2)	Rec. Direct		Set channel flag of Designated RCVR ON for Step Storage
CHN/	Command(2)	Rec. Direct		Set channel flag of Designated RCVR OFF for Step Storage
CHN?	Query(2)	Rec. Direct		Return channel flag status of Designated RCVR.
			CHN	Channel flag set ON.
			CHN/	Channel flag set OFF.
CLC	Command(2)	Rec. Direct		Clear all lockout channels of Designated RCVR
CLM	Command	Rec. Direct		Clear the memory of the Designated RCVR
@CLM	Command	Frnt Pnl		Clear the memory of the Selected RCVR
CLR	Command	Rec. Direct		Clear and initialize the Designated RCVR
@CLR	Command	Frnt Pnl		Clear and initialize the Selected RCVR
CORx	Command	Rec. Direct		Set COR level of Designated RCVR to x (x = 0-80) (greater than 80 = OFF) for WJ-8615, WJ-8615D (x = 0-40) (greater than 40 = OFF) for WJ-8617B, WJ-8618B, WJ-8619
@COR x	Command	Frnt Pnl		Set COR level of Selected RCVR to x (x = 0-80) (greater than 80 = OFF) for WJ-8615, WJ-8615D (x = 0-40) (greater than 40 = OFF) for WJ-8617B, WJ-8618B, WJ-8619
COR?	Query	Rec. Direct		What is COR setting of Designated RCVR?
			COR x	COR level is x (x = 0 - 80) (greater than 80 = OFF)
@COR?	Query	Frnt Pnl		What is COR setting of Selected RCVR?
			@COR x	COR level is x (x = 0 - 80) (greater than 80 = OFF)
CST?	Query	Rec. Direct		What is the status of Designated RCVR COR circuit?
			CST	Signal is above COR Threshold
			CST/	Signal is below COR Threshold

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. **WJ-8610A-1 Controller Table of Mnemonics** (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
@CST?	Query	Frnt Pnl		What is the status of Selected RCVR COR circuit?
			@CST	Signal is above COR Threshold
			@CST/	Signal is below COR Threshold
DET?	Query	Rec. Direct		What is detection mode on the Designated RCVR?
			AM	AM detection active
			FM	FM detection active
			CW	CW detection active
			PLS	Pulse detection active
			ISB	Independent Sideband active
			LSB	Lower Sideband active
			USB	Upper Sideband active
@DET?	Query	Frnt Pnl		What is detection mode on the Selected RCVR?
			@AM	AM detection active
			@FM	FM detection active
			@CW	CW detection active
			@PLS	PLS detection active
			@ISB	Independent Sideband active
			@LSB	Lower Sideband active
			@USB	Upper Sideband active
$DSP x	Command	Controller		Select display x on Controller CRT, where x equals: 0 = Help Display 1 = Receiver Status Table 2 = Configuration Table 1 3 = Configuration Table 2 4 = Selected Receiver Display 5 = Selected Receiver Configuration 6 = Controller Parameters 7 = Selected Scan Display 8 = Selected Trace Display 9 = Trace Configuration Table

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. WJ-8610A-1 Controller Table of Mnemonics (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
$DSP?	Query	Controller		Which display is present on the CRT?
			$DSP x	Display x is present on CRT, where: 0 = Help Display 1 = Receiver Status Table 2 = Configuration Table 1 3 = Configuration Table 2 4 = Selected Receiver Display 5 = Selected Receiver Configuration 6 = Controller Parameters 7 = Selected Scan Display 8 = Selected Trace Display 9 = Trace Configuration Table 10 = Help use Soft Keys
ERR?	Query	Rec. Direct		What is the last error number from the Designated RCVR?
			ERR x	Reading the error number sets it to 0. x = error code (0 = NO Error) (See Table 2-12)
@ERR?	Query	Frnt Pnl		What is the last error number from the Selected RCVR?
			@ERR x	Reading the error number sets it to 0. x = error code (0 = NO Error) (See Table 2-12)
$ERR?	Query	Controller		What Controller error number exists?
			$ERR x	Reading the error number sets it to 0. (See error Section) x = error code (0 = NO Error) (See Table 2-13)
$EXC x	Command	Controller		Execute memory channel x to Selected RCVR
FBW	Command	Rec. Direct		Select full bandwidth scan if the scan increment is set to 0. (SCI = 0)
FBW/	Command	Rec. Direct		Select half bandwidth scan if the scan increment is set to 0. (SCI = 0)
FBW?	Query	Rec. Direct		What is the default scan increment size?
			FBW	Full bandwidth increments
			FBW/	Half bandwidth increments
FM	Command	Rec. Direct		Set Designated RCVR to FM detection
@FM	Command	Frnt Pnl		Set Selected RCVR to FM detection
FM?	Query	Rec. Direct		What is the FM modulation on the Designated RCVR?
			FM x	FM modulation = x, where x = 0 to 100

Table 2-7. **WJ-8610A Controller Table of Mnemonics** (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
@FM?	Query	Frnt Pnl		What is the FM modulation on the Selected RCVR?
			@FM x	FM modulation = x, where x = 0 to 100
FMO?	Query	Rec. Direct		What is FM offset on Designated RCVR?
			FMO x	FM offset = x, where x = 0-225, 127 center tuned, greater than 127 = signal greater than tuned frequency, less than 127 = signal less than tuned frequency
@FMO?	Query	Frnt Pnl		What is FM offset on Selected RCVR?
			@FMO x	FM offset = x, where x = 0-225, 127 center tuned, greater than 127 = signal greater than tuned frequency, less than 127 = signal less than tuned frequency
$FND	Command	Controller		Do 488 address search of Receiver bus and learn limit of Receivers found
@FRL f	Command	Frnt Pnl		Set lower frequency limits of the Selected RCVR to f MHz
@FRL?	Query	Frnt Pnl		What is lower frequency limit of Selected RCVR?
			@FRL F	Lower frequency limit = f
FRQ f	Command	Rec. Direct		Set Designated RCVR to f MHz (0.0000 to 1200.0000) Limit based on RCVR options
@FRQ f	Command	Frnt Pnl		Set Selected RCVR to f MHz (0.0000 to 1200.0000) Limit based on RCVR options
FRQ?	Query	Rec. Direct		At what frequency is Designated RCVR set?
			FRQ f	The Designated RCVR is set to f MHz
@FRQ?	Query	Frnt Pnl		At what frequency is Selected RCVR set?
			@FRQ f	The Selected RCVR is set to f MHz
@FRU f	Command	Frnt Pnl		Set the upper frequency limit of Selected RCVR to f MHz
@FRU?	Query	Frnt Pnl		What is the upper frequency limit of the Selected RCVR?
			@FRU f	The upper frequency limit is f MHz
$HND x	Command	Controller		Hand off current selected RCVR parameters to RCVR x, (x = 0 - 14)
@INT	Command	Frnt Pnl		Initialize the Selected RCVR (See wake up section)

Table 2-7. WJ-8610A-1 Controller Table of Mnemonics (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
$INT	Command	Controller		Initialize Controller and restore the SRQ handler (See Initialization Section)
ISB	Command(1)	Rec. Direct		Set Designated RCVR to ISB detection
@ISB	Command(1)	Frnt Pnl		Set Selected RCVR to ISB detection
LCH?	Query(2)	Rec. Direct		Return last lockout channel used on the Designated RCVR
			LCH x	The last lockout used was x x = 0, means no lockouts used
LCK	Command(2,3)	Rec. Direct		Lockout current receiver frequency and width. Lockout width is equal to current bandwidth on the Designated RCVR.
LGV?	Query	Rec. Direct		What is the Log Video level of the Designated RCVR?
			LGV x	Log Video level of Designated RCVR is x (x = .5dB/increment) (x = 0 to 120)
@LGV?	Query	Frnt Pnl		What is the Log Video level of the Selected RCVR?
			@LGV x	Log Video level of Selected RCVR is x (x = .5dB/increment) (x = 0 to 120)
LKF f,w	Command(2)	Rec. Direct		Lockout frequency f and width w to Designated RCVR
@LRN	Command	Frnt Pnl		Learn the limits and options of Selected RCVR
$LRN	Command	Controller		Learn limits of all Receivers on Receiver Bus
LSB	Command	Rec. Direct		Select Lower Sideband on Designated RCVR
@LSB	Command	Frnt Pnl		Select Lower Sideband on Selected RCVR
MAN	Command	Rec. Direct		Set Designated RCVR to Manual operating mode (must be sent twice if in scan or step)
@MAN	Command	Frnt Pnl		Set Selected RCVR to Manual operating mode (must be sent twice if in scan or step)
MOD?	Query	Rec. Direct		What is current operating mode of Designated RCVR?
			MAN	Manual
			RCL	Recall
			SCN	Scan
			SCM	Scan Continue
			STP	Step
			STM	Step Continue

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. **WJ-8610A-1 Controller Table of Mnemonics** (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
@MOD?	Query	Frnt Pnl		What is current operating mode of Selected RCVR?
			@MAN	Manual
			@RCL	Recall
			@SCN	Scan
			@SCM	Scan Continue
			@STP	Step
			@STM	Step Continue
MSK x	Command	Rec. Direct		Set mask x to current Designated RCVR where: Bit Value/Function 1 = Allows RCVR SRQs on signal activity to cause controller SRQ 2 = Not used (power-up SRQ sensed as controller error) 4 = Allows RCVR queue full SRQ to cause controller SRQ 8 = Allows sequency complete RCVR SRQ to cause controller SRQ 16 = Not Used 32 = Allows RCVR error SRQ to cause controller SRQ 64 = Not Used 128 = Allows controller to cause SRQ on queue limit (QLT) receiver
MSK?	Query	Rec. Direct		Return mask for current Designated RCVR
			MSK x	The current mask is x (See MSK x)
OPT?	Query	Rec. Direct		What options are present in Designated RCVR?
			OPT x,x,x	(See manual for Associated receiver.)
PAR x	Command(2)	Rec. Direct		Partition memory for x storage channels on Designated RCVR. (0-71) the No. of lockouts = (71 - x) times 2. (Command clears RCVR memory)
PAR?	Query(2)	Rec. Direct		What is current partition size of the Designated RCVR?
			PAR x	Partition size is x
PLS	Command	Rec. Direct		Set Designated RCVR to Pulse Detection
@PLS	Command	Frnt Pnl		Set Selected RCVR to Pulse Detection
QLT x	Command	Rec. Direct		Set SRQ trip point as signals are loaded into receiver queue for Designated RCVR (x = 1-50) (x greater than 50 = OFF)

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. WJ-8610A-1 Controller Table of Mnemonics (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
QLT?	Query	Rec. Direct		What is current queue limit of Designated RCVR?
			QLT x	The current queue limit is x
QUE?	Query	Rec. Direct		Respond to queue command in Designated RCVR
			QUE ffff.ffff,tt.tt.tt,s*ffff.ffff,tt.tt.tt,s	Response to queue command if 2 signals acquired since last READ, where: f - frequency digits fixed point in MHz t - time digits (HH:MM:SS) fixed point s - status character * =Separator between queue entries A - COR Active at queue time I - COR Inactive at queue time
RCE x	Command(2)	Rec. Direct		Recall and execute memory channel x on Designated RCVR.
RCH a?	Query(2)	Rec. Direct		Return parameters in memory channel 'a' of the Designated RCVR.
			SCH a,b,c,d,e,f,g,h,i,j	(See SCH for definitions of a-j.)
RCL x	Command(3)	Rec. Direct		Recall channel x and enter recall mode on Designated RCVR
RCL?	Query(3)	Rec. Direct		What channel is recalled on Designated RCVR?
			RCL x	Last channel recalled was x
$RCL?	Query	Controller		What channel was last used in controller memory for STORE, EXAMINE or EXECUTE?
			$RCL x	Last channel used was x
RCV x	Command	Rec. Direct		Select RCVR x as the Designated RCVR (x = 0 - 14) (must be active receivers)
RFG x	Command	Rec. Direct		Set RF gain to x on Designated RCVR
RFG?	Query	Rec. Direct		What is the RF Gain Setting of Designated RCVR?
			RFG x	The RF Gain setting is x (x = 0 - 255)
@RFG x	Command	Frnt Pnl		Set RF gain to x on Selected Receiver
@RFG?	Query	Frnt Pnl		What is the RF Gain setting of Selected RCVR?
			@RFG x	The RF Gain setting is x (x = 0 - 225)

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. **WJ-8610A-1 Controller Table of Mnemonics** (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
RLK x?	Query(2)	Rec. Direct		Return Lockout frequency f and width w, of Designated RCVR lockout channel x
			LKF f,w	Lockout frequency is f MHz and width is w MHz.
RMT	Command	Rec. Direct		Set Designated RCVR to the remote mode
@RMT	Command	Frnt Pnl		Set Selected RCVR to the remote mode
$RMT	Command	Controller		Set Controller to the remote mode
RMT/	Command	Rec. Direct		Set Designated RCVR to local mode
@RMT/	Command	Frnt Pnl		Set Selected RCVR to local mode
$RMT/	Command	Controller		Set Controller to local mode
RMT?	Query	Rec. Direct		What is control status of Designated RCVR?
			RMT	Remote mode
			RMT/	Local mode
@RMT?	Query	Frnt Pnl		What is control status of Selected RCVR?
			@RMT	Remote mode
			@RMT/	Local mode
$RMT?	Query	Controller		What is control status of Controller?
			$RMT	Remote mode
			$RMT/	Local mode
SCH a,b,c,d,e,f,g,h,i,j	Command(2)	Rec. Direct		Store data b-j in channel 'a' of the Designated RCVR. This command is not error checked by the controller. a - Memory channel number 0 to par #. (0-#) b - Channel on/off flag. (CHN, CHN/) c - frequency (in MHz) d - bandwidth slot (1-5) e - COR level (0-80, greater than 80 =OFF) f - detection mode (AM,FM,CW,PLS,ISB,LSB,USB) g - afc mode (AFC or AFC/) h - agc mode (AGC or AGC/) i - rf gain (0-255) j - bfo frequency (in KHz)

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. **WJ-8610A-1 Controller Table of Mnemonics** (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
SCI f	Command(2)	Rec. Direct		Set scan increment of Designated RCVR to f MHz (10 kHz to 5 MHz, with 5 kHz resolution)
SCI?	Query(2)	Rec. Direct		Return current scan increment
			SCI f	Current Scan Increment is f MHz
SCN	Command	Rec. Direct		Continue Scan on Designated RCVR from Scan continue mode
SCN x	Command	Rec. Direct		Scan memory on Designated RCVR channel from x to x+1. Start frequency is in x; stop frequency is in x+1.
SCN x-y	Command(2)	Rec. Direct		Scan from start frequency in memory channel x to the stop frequency in memory channel y.
SCM	Command(2)	Rec. Direct		Enter Scan Continue mode from scan on Designated RCVR.
$SCN x	Command	Controller		Send Scan x to Selected RCVR and execute (x must by a scan setup No. from 1 to 30)
$SHL a,b,x,x...	Command	Controller		Set up a handoff list for a scan where: a = scan set up channel number b = release time in seconds (0 to 1000) (greater than 1000 = one shot handoff) x = handoff RVCR number up to 10 entries
SPE?	Query	Rec. Direct		What is the latched status byte from last serial poll of the Designated RCVR?
			SPE x	The binary value of last status byte is x (x = 0 - 255) See **Table 2-11.**
$SPE?	Query	Controller		What is current status byte of all 14 receivers?
			$SPE a,b,c,d,e,f,g, h,i,j,k,l,m,n,	where: a is RCVR 1 status byte b is RCVR 2 status byte . . . . n is RCVR 14 status byte See **Table 2-11.**

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. WJ-8610A-1 Controller Table of Mnemonics (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
$SRC a?	Query	Controller		Return scan parameters stored in scan set-up channel a.
			$SST a,b,c,d,e,f,g, h,i,j,k,l,m,n,	where: a - Channel number 1-30 b - scan mode: 0 - Free (signal contols start/stop) 1 - hold (stop on signal, continue on scan command) 2 - queue (stop only long enough to queue signals) c - Handoff mode 0 - off 1 - auto handoff d - start frequency in MHz e - stop frequency in MHz f - step size frequency in MHz (from .010 MHz to 5.000 MHz, in .005 MHz increments) g - bandwidth (10-8000 kHz) h - COR level (0-80, greater than 80 = OFF) i - det mode (AM,FM,CW,PLS,LSB,USB or ISB) j - afc (AFC or AFC/) k - agc (AGC or AGC/) l - rfg (0-255) m - bfo (+/-2.0 kHz in SSB, +/-4.0 kHz in CW) n - dwl (0-255) (Used on WJ-8618BB only)
$SRH a?	Query	Controller		Return handoff list from scan set-up a.
			$SHL a,b,x,x...	Handoff list is $SHL a,b,x,x..., where: a = scan set up channel number b = release time in seconds (0 to 1000) (greater than 1000 = one shot handoff) x = handoff RVCR number up to 10 entries
SS?	Query	Rec. Direct		What is signal strength of Designated RCVR?
			SS x	The binary value of signal strength is x (x = 0 - 255) in dbm.
@SS?	Query	Frnt Pnl		What is signal strength of Selected RCVR?
			@SS x	The binary value of signal strength is x (x = 0 - 255) in dbm.
$SSP	Command	Controller		Scan stop command for Selected RCVR (Sets receiver to Manual mode of operation).
$SST a,b,c,d,e,f,g,h,i,j,k,l,m,n	Command	Controller		Scan Parameters stored in scan set-up number 1-30. (See $SRC a? for definition of a - n)
STM	Command(2)	Rec. Direct		Enter step/continue mode from step

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

Table 2-7. **WJ-8610A-1 Controller Table of Mnemonics** (Cont'd)

MNEMONIC	TYPE	CATEGORY	RESPONSE	DESCRIPTION
$STO x	Command	Controller		Store current front panel parameters of Controller in Controller memory channel x.
STP x-y	Command(2)	Rec. Direct		Step from memory channel x through channel y on Designated RCVR.
STP x,y,z	Command(2)	Rec. Direct		Step to memory channels in list x,y,z on Designated RCVR.
STP	Command(2,3)	Rec. Direct		Continue step from step continue mode on Designated RCVR
STP x	Command(2,3)	Rec. Direct		Step from memory channel 0 thru x on Designated RCVR
$TIM hh:mm	Command	Controller		Set Time Clock used for queue operation hh = hours, mm = minutes
$TIM?	Query	Controller		Read clock & report time, hh:mm:ss
			$TIM hh:mm:ss	The time is hh:mm:ss hh = hours mm = minutes ss = seconds
@TYP x	Command	Frnt Pnl		Set receiver type of the Selected RCVR to x, where x is equal to (0-5) 0 = not defined 1 = monitor (mntr) 2 = fixed (fixd) 3 = hand off (hndf) 4 = controller (ctl) 5 = pass-through (pthr)
@TYP?	Query	Frnt Pnl		What type is the Selected Receiver?
			@TYP x	The Selected RCVR type is x, where x equals: 0 = not defined 1 = monitor (mntr) 2 = fixed (fixd) 3 = hand off (hndf) 4 = controller (ctl) 5 = pass-through (pthr) greater than 128=not in service (nis)
ULC x	Command(2)	Rec. Direct		Unlock receiver lockout channel x on Designated RCVR.
ULF f	Command(2)	Rec. Direct		Unlock lockout frequency f on Designated RCVR.
USB	Command	Rec. Direct		Set Designated RCVR to upper sideband
@USB	Command	Frnt Pnl		Set Selected RCVR to upper sideband

NOTES:
(1) For WJ-8615/WJ-8615D receivers with or without SSL.
(2) For WJ-8615/WJ-8615D receivers with SSL only.
(3) For WJ-8617B, WJ-8618B and WJ-8619 receivers only.

2.4.3 EXAMPLES OF CONTROL COMMANDS

2.4.3.1 Controller and Front Panel Emulation — In the example that follows, the controller command is used to select the receiver to be placed under active control. Once selected, all front panel emulation commands will be directed to that selected receiver.

EXAMPLE: $RMT; $RCV 1; @ FRQ 234.5678; @ BW 3 (LF)

$RMT - Places Controller into the Remote mode

$RCV 1 - Directs the Controller to select RCVR #1 as the Selected Receiver

@FRQ 234.5678 - Tunes the Controller to 234.5678 MHz. This in turn will tune the Selected Receiver to 234.5678 MHz.

@BW3 - Sets the Controller to bandwidth #3. The Selected Receiver will follow.

(LF) - Message Terminator

EXAMPLE: @FRQ 25; @AM (LF)

@FRQ 25 - Tunes the Controller to 25.0000 MHz. The Selected Receiver will follow. (The Selected receiver will be the one selected with the last "$RCV x" command.)

@AM - Sets the Controller for AM detection. The Selected receiver will follow.

(LF) - Message Terminator

2.4.3.2 Examples of Queries — The examples that follow are examples of remote queries and the responses from the Controller. The illustrated responses will be returned in a fixed field format. In the examples, the receiver is tuned to 25 MHz and the COR level is set to 15. The Selected Receiver is receiver #1, as selected in the previous example.

EXAMPLE: $RCV?; @FRQ?; @COR? (LF)

$RCV? - Which receiver is selected by the Controller?

@FRQ? - What is the tuned frequency of the Selected Receiver?

@COR? - What is the COR level of the Selected Receiver?

(LF) - Message Terminator

RESPONSE: $RCV _ _ _ 1; @FRQ _ _ _ 25.0000; @COR _ _ 15 LF

$RCV _ _ 1 - Receiver #1 is the Selected RCVR

@FRQ _ _ 25.0000 - The Selected Receiver is set to 25.0000 MHz

@COR _ _ 15 - The Selected Receiver COR level is set to 15

LF - Message Terminator

NOTE: (_) is ASCII for a space.

2.4.3.3 **Example of Receiver Direct Commands** — The example of the Receiver Direct Commands illustrates remote communications by way of a designated destination receiver path. The path that is opened in this category of commands permits direct communication with a designated receiver and is directed to the receiver that is specified by the "RCV x" command. This command will not affect the selected receiver selection "$RCV x" illustrated in previous examples. In the example that follows, the use of an embedded receiver number is included in the data string. This receiver number will temporarily redirect the data to the new designated receiver. Once the data string is terminated, the designated receiver will revert back to the original receiver number which was selected by the last "RCV x" command.

EXAMPLE: RCV 1; FRQ 25; COR 20; 2; FRQ 20 LF

RCV 1 - Opens a designated destination path to receiver number 1

FRQ 25 - Sets Designated receiver number 1 to 25.0000 MHz

COR 20 - Sets the COR level of the Designated receiver to a value of 20.

2 - (Embedded receiver number) Temporarily redirects data to receiver number 2.

FRQ 20 - Sets the tuned frequency of receiver number 2 to 20.0000 MHz.

LF - Message Terminator

2.4.3.4 **Examples of Pass-Through Commands** — In the pass-through (pthr) category of commands, the remote computer communicates directly with a Selected receiver. The receiver must be a pass-through receiver to accept these commands. Data following the pass-through designation may be either ASCII or binary and must be formated as required for the type receiver that is used. Refer to the appropriate Receiver Manual for details on the remote requirements.

EXAMPLE: (Command Format:)

7< 55 (Hex)

7< 55 (Hex) - Set pass through receiver number 7 to the ASCII mode. (55 Hex is the binary code to set the WJ-861X family receivers to ASCII mode.)

EOI - Must be set when the last byte of the message is sent to terminate the message.

2.4.4 SERVICE REQUEST OPERATION

The WJ-8610A-1 is capable of activating the service request line on the IEEE-488 remote bus. There are three categories of stimuli that may cause an SRQ. They are: controller power up, controller error and receiver bus SRQ. The cause of the SRQ on the remote bus is determined by serial polling the controller. It will return a status byte indicating if SRQ is set in the controller and the cause. Reading this register will clear any status bits that are set.

2.4.4.1 **SRQ on Power-up** — On power-up of the controller, it sets SRQ and bit 1 of the serial poll status byte. No action is required of the controller upon receiving this SRQ.

2.4.4.2 **SRQ on Controller Error** — Errors in the controller such as invalid remote messages to the controller, receiver turning off or on, cause SRQ and bit 4 of the serial poll status byte to set. Asking $ERR? of the controller will result in the last sent error number being returned.

2.4.4.3 **SRQ From a Receiver** — SRQs from receivers on the receiver bus may cause SRQs to be passed through to the remote bus. The system computer may decide what receiver(s) and causes in each receiver should cause an SRQ on the remote bus. The mask (MSK x) enable byte for each receiver decides which functions in that receiver will be allowed to cause an SRQ on the remote bus. The configuration must also be set to allow the receiver to cause the SRQ on the receiver bus. The controller will set the configuration bits it needs to perform the specified task. Included with the SRQs passed from the receiver is the queue limit indicator. The SRQ may be passed from any receiver that has the appropriate mask enabled.

2.4.4.4 **Mask of Receiver SRQs** — In order to get SRQs passed from the receivers to the controller, the following conditions must be met. The mask for the receiver must be set to allow the receiver SRQ to be passed to the remote, before the receiver SRQ occurs. The configuration (CFG #) on the receiver must be set to cause the SRQ from the receiver.

Table 2-8. Mask (MSK x) Bit Definitions

BIT	BIT VALUE	DESCRIPTION
0	1	Allows receiver SRQs on signal activity to cause controller SRQ.
1	2	Not used (power-up SRQ sensed as controller error).
2	4	Allows receiver queue full SRQ to cause controller SRQ.
3	8	Allows sequence complete receiver SRQ to cause controller SRQ.
4	16	Not used
5	32	Allows receiver error SRQ to cause controller SRQ.
6	64	Not used
7	128	Allows controller to cause SRQ on queue limit (QLT) encountered for this receiver.

2.4.4.5 Configuration to Generate Receiver SRQs — The controller allows logical ORing of the configuration register to allow receiver options such as stop on receiver full queue, single sequence or log all signals to be selected by an external computer. When executing a scan, from scan control ($SCN #), the controller will OR the bits it requires with the current configuration bits. When the scan is executed from local scan control the configuration will be set to what is required by the WJ-8610A-1 Controller. The default bit setting for each of the scan types is listed in the SCAN MODE STATUS columns of **Table 2-9.**

Table 2-9. Service Request (SRQ) Bit Definitions

CFG BIT	BIT VALUE	DESCRIPTION	SCAN MODE STATUS (1=SET; 0=CLEARED) FREE	HOLD	QUEUE
0	1	Enable receiver SRQ on COR status change (this configuration used by the controller).	1	1	1
1	2	Cause AGC to re-attack on new frequency commands.	0	0	0
2	4	Cause continue mode on signals acquired in scan or step (used by the controller free or hold scan).	1	1	0
3	8	Cause continue mode after single scan or step sequence.	0	0	0
4	16	Cause frequency queue operation in scan or step. (used by the controller in queue scan)	0	0	1

Table 2-9. Service Request (SRQ) Bit Definitions (Cont'd)

CFG BIT	BIT VALUE	DESCRIPTION	SCAN MODE STATUS (1=SET; 0=CLEARED) FREE	HOLD	QUEUE
5	32	Stop on full receiver queue.	0	0	0
6	64	Log all signals encountered, not just leading edges.	0	0	0
7	128	Not used	0	0	0

2.4.5 SERIAL POLL STATUS BYTES

2.4.5.1 Controller Status Byte — Reading the serial poll status byte of the controller resets the SRQ and identifies the cause of the SRQ. With the exception of the buffer empty status bit, all other used status bits in the controller cause SRQ to be set when they become active. All the bits which cause SRQ upon becoming active are reset by the serial poll status read.

Table 2-10. Controller Status Byte Bit Definitions

BIT	BIT VALUE	DESCRIPTION
0	1	Receiver direct buffer empty indicator. As direct commands are received they are placed in a buffer and sent to the receivers as time is available on the receiver bus. This bit being set indicates all buffered messages have been sent. Changes in status of this bit do not cause an SRQ. This bit is a non-latched indicator.
1	2	Controller power-up caused SRQ. Reset by reading the status byte.
2	4	Not used.
3	8	Not used.
4	16	Controller error caused SRQ. Reset by reading the status byte.
5	32	Unmasked SRQ on receiver bus caused SRQ. Reset by reading the status byte. Identify the receiver by reading receiver status bytes with either $SPE? or #;SPE?. The results of the status read should be ANDed with the masks for each receiver.
6	64	SRQ caused by this unit. (RVS) Reset by reading status byte.
7	128	Not used.

2.4.5.2 **Receiver Status Byte** — The last latched serial poll status byte of each of the active receivers connected to the controller may be read through the remote bus. There are two commands that allow access to this information. They are $SPE?, which returns the status bytes of all 14 receiver stations, and #;SPE?, which returns the status byte of the receiver specified with the #. Either command causes the read status bytes to reset to zero. The receiver status bytes are ORed with the previous data in the status byte each time the SRQ line is set by a particular receiver. So, when the system computer reads the status bytes, it sees a latched history of SRQs by receiver. Information such as current COR status should be read using the CST? query.

Table 2-11. Serial Poll Status Byte of a Receiver ($SPE?, #;SPE?)

BIT	BIT VALUE	DESCRIPTION
0	1	Signal activity has caused a receiver SRQ. This is a latched indicator that is set for signals either going above or below the COR threshold. This is a latched indicator that is reset by the status read. Signal activity may be examined by reading the receiver queue (#;QUE?) or current status available with (#;COR?). The proper configuration (#;CFG#) and mask (#;MSK#) must be set to enable SRQ to be passed to the remote bus.
1	2	Receiver has been powered up or initialized since the last status byte read. This indicator will not cause an SRQ on the remote bus. The controller will report an error SRQ for receiver power up or down.
2	4	Receiver queue full caused SRQ. Continue mode has been entered by the receiver. The proper configuration (#;CFG#) and mask (#;MSK#) must be set to enable SRQ to be passed to the remote bus.
3	8	Sequence complete caused SRQ. Continue mode has been entered by the receiver. The proper configuration (#;CFG#) and mask (#;MSK#) must be set to enable SRQ to be passed to the remote bus.
4	16	Not used.
5	325	Receiver error caused SRQ. Error number may be read with (#;ERR?). The proper mask (#;MSK#) must be set to enable SRQ to be passed to the remote bus.
6	64	SRQ caused by this receiver.
7	128	Encountering queue limit set SRQ. Reading the queue will re-enable SRQ. The proper mask (#;MSK#) must be set to enable SRQ to be passed to the remote bus.

2.4.6 ERRORS

Should an error occur that is associated with the receiver operation, the ERROR# field will display the last received error condition that has been reported. A list of the two digit codes used, and their description will be found in **Table 2-12.**

Table 2-12. Receiver Error Messages

Error Code	Description
00	No Error
21	First LO unlocked for greater than 75 ms.
22	Second LO unlocked for greater than 75 ms.
23	Third LO unlocked for greater than 75 ms.
30	Protected RAM error detected.
33	Fine tune reference out of tolerance.
34	Unable to calibrate 2nd LO.
01	488 input buffer overflow, greater than 80 characters.
02	Illegal message format, less than 2 characters in ASCII.
04	Number is out of range for this command
05	"/" or "?" is not valid for this command.
07	Invalid mnemonic or binary command.
70	Permission to calibrate requested.
71	Calibration in progress.
72	Calibration is complete.
73	Calibration is aborted.
51	No more lockout space in lockout Memory.
52	Attempt to store a memory channel greater than partition limit.
10	Attempt to scan/step undefined channel.
13	Attempt to scan with start frequency greater than or equal to stop.
14	Attempt to select an illegal bandwidth slot. (no bandwidth in slot)
15	Attempt scan/step without a valid calibration.
16	Attempt to unlock a non-existent lockout frequency.
17	Attempt to scan or step when the receiver has been on less than 45 minutes.

Should an error occur when operating the WJ-8610A-1 Controller, the error will be reported to the Controller (CRT) and SRQ will be set at the controllers computer interface to notify the remote computer that service is required. The controller front panel CRT will display the ERROR Code with the word "ERROR" and the code number at the bottom of the screen. The Error Codes used, and the description on each will be found in **Table 2-13.** The Error Code is available to the remote computer over the controller's computer interface upon request, by sending an error query. The controller will respond with the three digit code that describes the error.

Table 2-13. **WJ-8610A-1 Controller Error Codes**

ERROR	DESCRIPTION	CAUSE	COMMENTS
001	Remote 488 input buffer overflow.	More than 100 characters in input string.	Entire input message is ignored and input buffer pointer is reset to the beginning.
003	Invalid RCVR selection.	An attempt was made to use RCVR of incorrect type.	Input string ignored from error to terminator.
004	Invalid mnemonic argument.	Invalid variables sent with the mnemonics or "/" or "?" has been sent with a mnemonic that does not support these characters.	Input string ignored from error to terminator.
007	Invalid mnemonic received.	Mnemonic not defined.	Input string ignored from error to terminator.
100+ RCVR #	RCVR not answering.	Invalid command in pthr or selected RCVR no longer functioning.	RCVR type is set to not in service (nis). i.e. RCVR #1 = ERR 101 RCVR #2 = ERR 102
120+ RCVR #	RCVR restored to service.	RCVR set SRQ and power up bit.	RCVR restored to service type classification previously set. Now available for use.
140+ RCVR #	RCVR returned invalid response.	RCVR output data not able to be decoded. Usually two or more receivers at the same IEEE-488 Address.	Invalid message is ignored from error to terminator.
200	RCVR bus search found more than 14 RCVRS.	More than 14 RCVRs answered serial poll.	Possible SRQ or bus loading problems (WJ-8610A-1 will allow operation).

Table 2-13. **WJ-8610A-1 Controller Error Codes** (Cont'd)

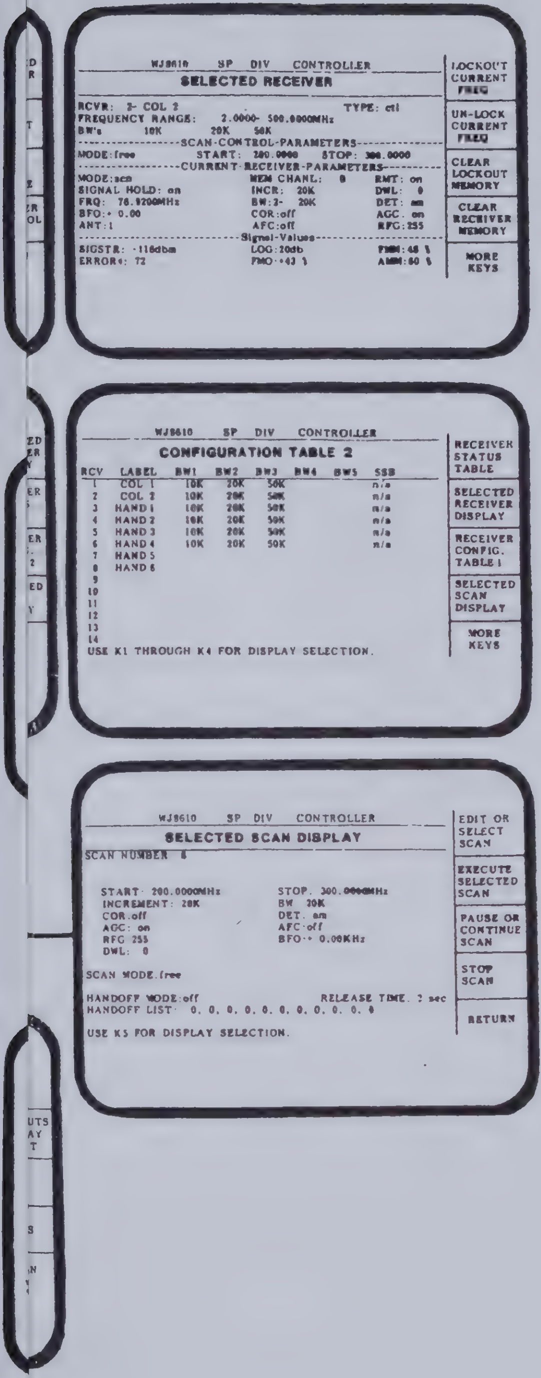
ERROR	DESCRIPTION	CAUSE	COMMENTS
201	Unidentified SRQ on RCVR bus.	Active SRQ from unit never defined in RCVR table.	SRQ service on RCVR bus disabled. Try "FIND & LEARN" -Other WJ-8610A-1 operation continues.
202	Receiver bus is inoperable.	No devices or a bad device on receiver bus.	Check all receivers to make sure none are in Master/Slave mode. Check 488 cables to receivers.
203	Command incompatible with receiver.	A valid command was sent to a receiver which could not accept it.	Example: Scan queue operation to WJ-8617B or WJ-8618B.
204	Trace hardware not operational.	Messages to the trace section were not accepted.	Operation continues without trace functions.

2.5 EQUIPMENT MALFUNCTIONS

This unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. If malfunctions are encountered after following the recommended installation procedures, **paragraph 2.2**, verify that the correct input signals are present at the proper jacks. Maintenance and troubleshooting of the unit can be aided utilizing the schematic diagrams in **Section IV** of this manual. Contact your Watkins-Johnson representative or the Watkins-Johnson Company, SP Division, Gaithersburg, Maryland to prevent possible warranty voiding prior to undertaking any corrective maintenance action.

2.6 PREPARATION FOR RESHIPMENT

If the WJ-8610A-1 Controller must be prepared for reshipment, the packaging methods should follow the pattern established in the original shipment. If retained, the original materials can be reused to a large extent or at least provide guidance for the repackaging effort.



```
          WJ8610     SP   DIV    CONTROLLER
                  SELECTED RECEIVER
RCVR:  2- COL 2                          TYPE: ctl
FREQUENCY RANGE:    2.0000- 500.0000MHz
BW's        10K        20K     50K
-------------------SCAN-CONTROL-PARAMETERS------------------
MODE:free          START:  200.0000    STOP:  300.0000
-------------------CURRENT-RECEIVER-PARAMETERS--------------
MODE:scn                  MEM CHANL:    0      RMT: on
SIGNAL HOLD: on           INCR:   20K          DWL:   0
FRQ:  76.9200MHz          BW:3-   20K          DET:  am
BFO:+ 0.00                COR:off              AGC.  on
ANT:1                     AFC:off              RFG:255
---------------------------Signal-Values--------------------
SIGSTR:  -116dbm          LOG:20db             FMM:48 %
ERROR#:  72               FMO·+43 %            AMM:60 %
```

LOCKOUT CURRENT FREQ
UN-LOCK CURRENT FREQ
CLEAR LOCKOUT MEMORY
CLEAR RECEIVER MEMORY
MORE KEYS

```
          WJ8610     SP   DIV    CONTROLLER
               CONFIGURATION TABLE 2
RCV   LABEL    BW1    BW2    BW3    BW4    BW5    SSB
 1    COL 1    10K    20K    50K                  n/a
 2    COL 2    10K    20K    50K                  n/a
 3    HAND 1   10K    20K    50K                  n/a
 4    HAND 2   10K    20K    50K                  n/a
 5    HAND 3   10K    20K    50K                  n/a
 6    HAND 4   10K    20K    50K                  n/a
 7    HAND 5
 8    HAND 6
 9
10
11
12
13
14
USE K1 THROUGH K4 FOR DISPLAY SELECTION.
```

RECEIVER STATUS TABLE
SELECTED RECEIVER DISPLAY
RECEIVER CONFIG. TABLE 1
SELECTED SCAN DISPLAY
MORE KEYS

```
          WJ8610     SP   DIV    CONTROLLER
               SELECTED SCAN DISPLAY
SCAN NUMBER  6

  START· 200.0000MHz           STOP. 300.0000MHz
  INCREMENT: 20K               BW  20K
  COR.off                      DET. am
  AGC: on                      AFC·off
  RFG 255                      BFO·+ 0.00KHz
  DWL:  0

SCAN MODE.free

HANDOFF MODE:off                       RELEASE TIME. 2 sec
HANDOFF LIST·  0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

USE K5 FOR DISPLAY SELECTION.
```

EDIT OR SELECT SCAN
EXECUTE SELECTED SCAN
PAUSE OR CONTINUE SCAN
STOP SCAN
RETURN

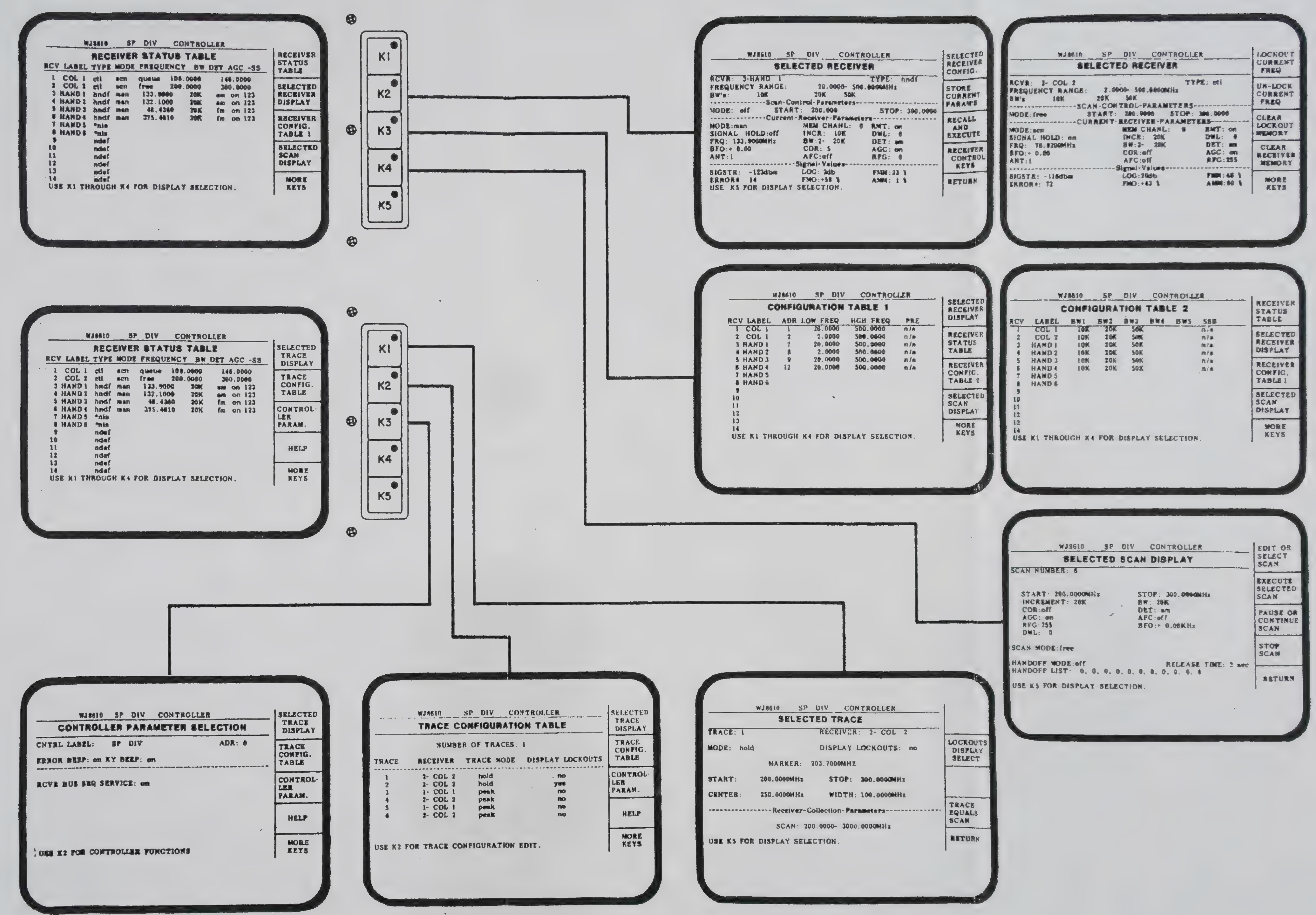
e 2-16. WJ-8610A-1 Controller CRT Display Block Diagram

2.5 EQUIPMENT MALFUNCTIONS

This unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. If malfunctions are encountered after following the recommended installation procedures, **paragraph 2.2**, verify that the correct input signals are present at the proper jacks. Maintenance and troubleshooting of the unit can be aided utilizing the schematic diagrams in **Section IV** of this manual. Contact your Watkins-Johnson representative or the Watkins-Johnson Company, SP Division, Gaithersburg, Maryland to prevent possible warranty voiding prior to undertaking any corrective maintenance action.

2.6 PREPARATION FOR RESHIPMENT

If the WJ-8610A-1 Controller must be prepared for reshipment, the packaging methods should follow the pattern established in the original shipment. If retained, the original materials can be reused to a large extent or at least provide guidance for the repackaging effort.


K1
K2
K3
K4
K5

```
WJ8610     SP  DIV     CONTROLLER
        RECEIVER STATUS TABLE
RCV LABEL TYPE MODE FREQUENCY  BW DET AGC -SS
 1  COL 1  ctl  scn  queue  108.0000     146.0000
 2  COL 2  ctl  scn  free   200.0000     300.0000
 3 HAND 1  hndf man  133.9000   20K   am  on 123
 4 HAND 2  hndf man  132.1000   20K   am  on 123
 5 HAND 3  hndf man   48.4360   20K   fm  on 123
 6 HAND 4  hndf man  375.4610   20K   fm  on 123
 7 HAND 5  *nis
 8 HAND 6  *nis
 9         ndef
10         ndef
11         ndef
12         ndef
13         ndef
14         ndef
USE K1 THROUGH K4 FOR DISPLAY SELECTION.
```

RECEIVER STATUS TABLE
SELECTED RECEIVER DISPLAY
RECEIVER CONFIG. TABLE 1
SELECTED SCAN DISPLAY
MORE KEYS

```
WJ8610    SP    DIV     CONTROLLER
          SELECTED RECEIVER
RCVR:  3-HAND 1                        TYPE:  hndf
FREQUENCY RANGE:        20.0000- 500.0000MHz
BW's:        10K          20K     50K
---------------Scan-Control-Parameters----------------
MODE:  off       START:  200.000          STOP: 300.0000
---------------Current-Receiver-Parameters------------
MODE:man                MEM CHANL:  0   RMT: on
SIGNAL  HOLD:off        INCR:   10K     DWL:  0
FRQ: 133.9000MHz        BW:2-   20K     DET: am
BFO:+ 0.00              COR:  5         AGC: on
ANT:1                   AFC:off         RFG:  0
------------------------Signal-Values-----------------
SIGSTR:  -123dbm        LOG: 2db        FMM:23 %
ERROR#   14             FMO:+58 %       AMM: 1 %
USE  K5 FOR DISPLAY SELECTION.
```

SELECTED RECEIVER CONFIG.
STORE CURRENT PARAM'S
RECALL AND EXECUTE
RECEIVER CONTROL KEYS
RETURN

```
WJ8610      SP    DIV    CONTROLLER
          SELECTED RECEIVER
RCVR:  2- COL 2                          TYPE: ctl
FREQUENCY RANGE:     2.0000- 500.0000MHz
BW's        10K        20K     50K
-----------------SCAN-CONTROL-PARAMETERS--------------
MODE:free          START:  200.0000   STOP: 300.0000
-----------------CURRENT-RECEIVER-PARAMETERS----------
MODE:scn                  MEM CHANL:   0     RMT: on
SIGNAL HOLD: on           INCR:   20K        DWL:   0
FRQ:  76.9200MHz          BW:2-   20K        DET: am
BFO:+ 0.00                COR:off            AGC: on
ANT:1                     AFC:off            RFG:255
-------------------------Signal-Values----------------
SIGSTR: -118dbm           LOG:20db           FMM:48 %
ERROR#: 72                FMO:+43 %          AMM:60 %
```

LOCKOUT CURRENT FREQ
UN-LOCK CURRENT FREQ
CLEAR LOCKOUT MEMORY
CLEAR RECEIVER MEMORY
MORE KEYS

```
WJ8610      SP  DIV    CONTROLLER
      CONFIGURATION TABLE 1
RCV LABEL   ADR LOW FREQ    HGH FREQ    PRE
 1  COL 1    1    20.0000   500.0000    n/a
 2  COL 1    2     2.0000   500.0000    n/a
 3 HAND 1    7    20.0000   500.0000    n/a
 4 HAND 2    8     2.0000   500.0000    n/a
 5 HAND 3    9    20.0000   500.0000    n/a
 6 HAND 4   12    20.0000   500.0000    n/a
 7 HAND 5
 8 HAND 6
 9
10
11
12
13
14
USE K1 THROUGH K4 FOR DISPLAY SELECTION.
```

SELECTED RECEIVER DISPLAY
RECEIVER STATUS TABLE
RECEIVER CONFIG. TABLE 2
SELECTED SCAN DISPLAY
MORE KEYS

```
WJ8610      SP   DIV    CONTROLLER
      CONFIGURATION TABLE 2
RCV   LABEL   BW1   BW2   BW3   BW4   BW5   SSB
 1    COL 1   10K   20K   50K               n/a
 2    COL 2   10K   20K   50K               n/a
 3   HAND 1   10K   20K   50K               n/a
 4   HAND 2   10K   20K   50K               n/a
 5   HAND 3   10K   20K   50K               n/a
 6   HAND 4   10K   20K   50K               n/a
 7   HAND 5
 8   HAND 6
 9
10
11
12
13
14
USE K1 THROUGH K4 FOR DISPLAY SELECTION.
```

RECEIVER STATUS TABLE
SELECTED RECEIVER DISPLAY
RECEIVER CONFIG. TABLE 1
SELECTED SCAN DISPLAY
MORE KEYS

```
WJ8610      SP  DIV    CONTROLLER
        SELECTED SCAN DISPLAY
SCAN NUMBER: 6


  START· 200.0000MHz           STOP: 300.0000MHz
  INCREMENT: 20K               BW: 20K
  COR:off                      DET: am
  AGC: on                      AFC:off
  RFG:255                      BFO:+ 0.00KHz
  DWL:  0

SCAN MODE:free

HANDOFF MODE:off                    RELEASE TIME: 2 sec
HANDOFF LIST·  0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0

USE K5 FOR DISPLAY SELECTION.
```

EDIT OR SELECT SCAN
EXECUTE SELECTED SCAN
PAUSE OR CONTINUE SCAN
STOP SCAN
RETURN

```
WJ8610     SP  DIV     CONTROLLER
        RECEIVER STATUS TABLE
RCV LABEL TYPE MODE FREQUENCY  BW DET AGC -SS
 1  COL 1  ctl  scn  queue  108.0000     146.0000
 2  COL 2  ctl  scn  free   200.0000     300.0000
 3 HAND 1  hndf man  133.9000   20K   am  on 123
 4 HAND 2  hndf man  132.1000   20K   am  on 123
 5 HAND 3  hndf man   48.4360   20K   fm  on 123
 6 HAND 4  hndf man  375.4610   20K   fm  on 123
 7 HAND 5  *nis
 8 HAND 6  *nis
 9         ndef
10         ndef
11         ndef
12         ndef
13         ndef
14         ndef
USE K1 THROUGH K4 FOR DISPLAY SELECTION.
```

SELECTED TRACE DISPLAY
TRACE CONFIG. TABLE
CONTROLLER PARAM.
HELP
MORE KEYS

```
WJ8610   SP  DIV   CONTROLLER
  CONTROLLER PARAMETER SELECTION
CNTRL LABEL:    SP  DIV                 ADR: 0

ERROR BEEP: on KY BEEP: on
-------------------------------------------------

RCVR BUS SRQ SERVICE: on




USE K2 FOR CONTROLLER FUNCTIONS
```

SELECTED TRACE DISPLAY
TRACE CONFIG. TABLE
CONTROLLER PARAM.
HELP
MORE KEYS

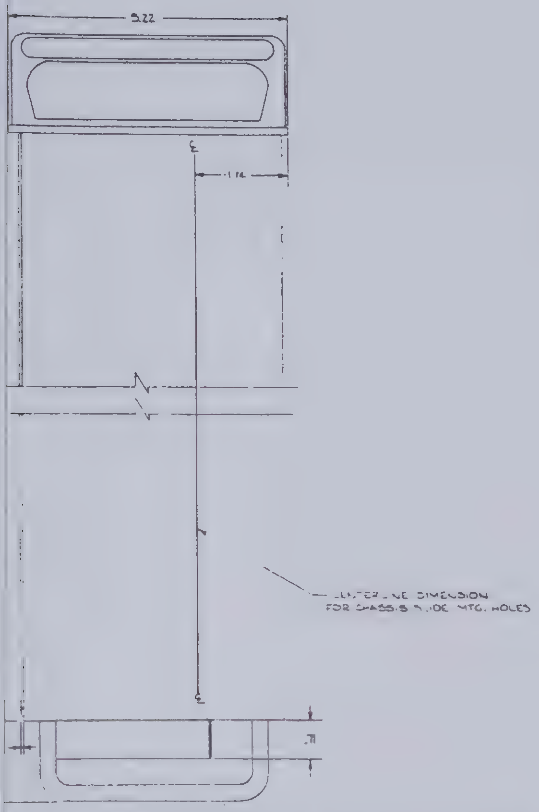
```
WJ8610      SP  DIV    CONTROLLER
      TRACE CONFIGURATION TABLE

         NUMBER OF TRACES: 1

TRACE     RECEIVER   TRACE MODE   DISPLAY LOCKOUTS
--------------------------------------------------
  1       2- COL 2      hold            no
  2       2- COL 2      hold            yes
  3       1- COL 1      peak            no
  4       2- COL 2      peak            no
  5       1- COL 1      peak            no
  6       2- COL 2      peak            no


USE K2 FOR TRACE CONFIGURATION EDIT.
```

SELECTED TRACE DISPLAY
TRACE CONFIG. TABLE
CONTROLLER PARAM.
HELP
MORE KEYS

```
WJ8610     SP   DIV    CONTROLLER
           SELECTED TRACE
TRACE: 1                  RECEIVER:  2- COL  2

MODE:  hold               DISPLAY LOCKOUTS:  no

            MARKER:  203.7000MHZ

START:      200.0000MHz      STOP:  300.0000MHz

CENTER:     250.0000MHz      WIDTH: 100.0000MHz
----------------Receiver-Collection-Parameters--------------

             SCAN: 200.0000- 3000.0000MHz

USE K5 FOR DISPLAY SELECTION.
```

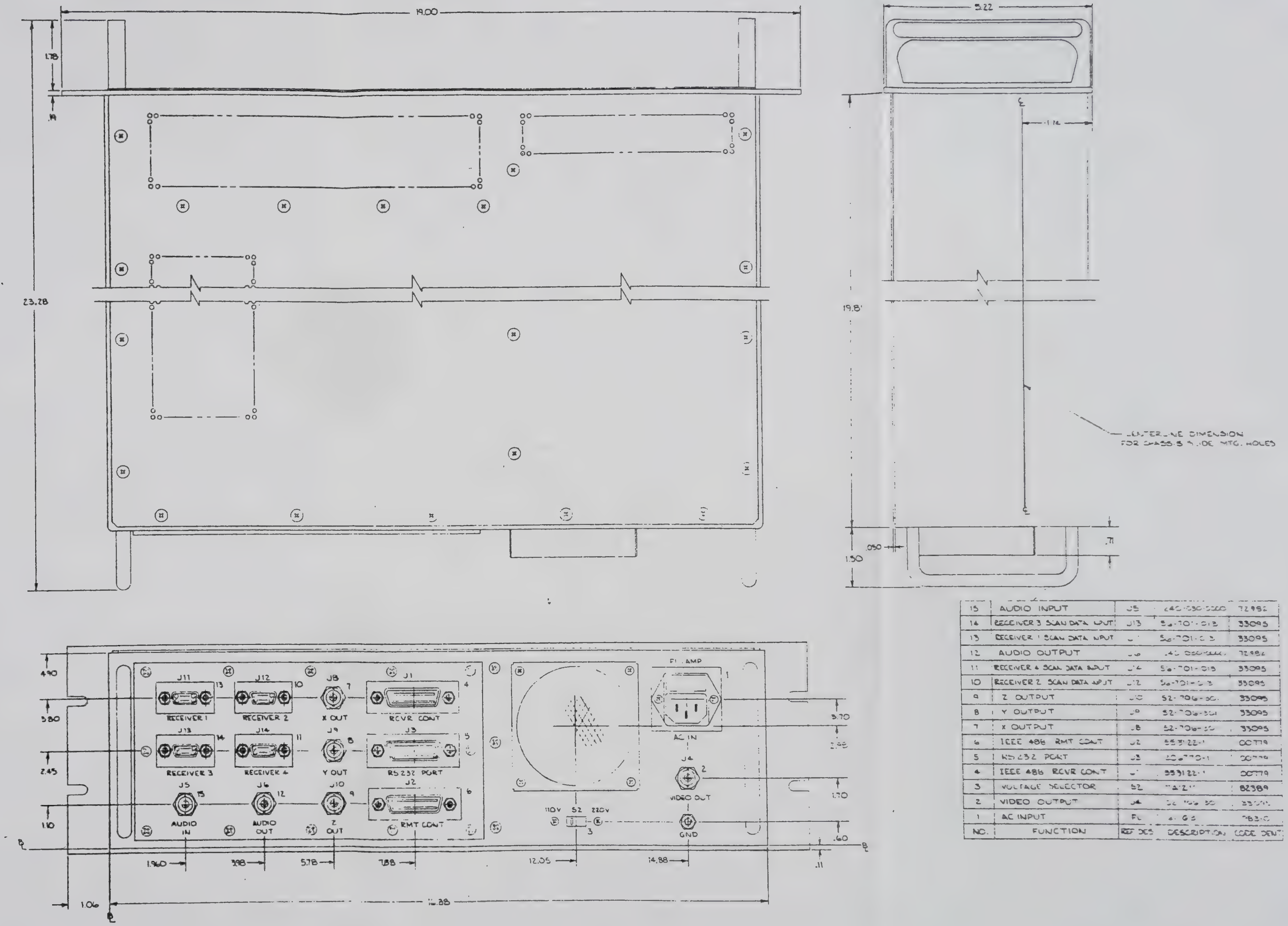
LOCKOUTS DISPLAY SELECT
TRACE EQUALS SCAN
RETURN

Figure 2-16. WJ-8610A-1 Controller CRT Display Block Diagram



NO	FUNCTION	REF DES	DESCRIPTION	CODE IDENT
15	AUDIO INPUT	J5	[illegible]	72982
14	RECEIVER 3 SCAN DATA INPUT	J13	56-701-013	33095
13	RECEIVER 1 SCAN DATA INPUT	[illegible]	56-701-013	33095
12	AUDIO OUTPUT	[illegible]	[illegible]	72982
11	RECEIVER 4 SCAN DATA INPUT	J14	56-701-013	33095
10	RECEIVER 2 SCAN DATA INPUT	J12	56-701-013	33095
9	Z OUTPUT	J10	52-706-501	33095
8	Y OUTPUT	J9	52-706-501	33095
7	X OUTPUT	J8	52-706-501	33095
6	IEEE 488 RMT CONT	J2	553122-1	00779
5	RS232 PORT	J3	206770-1	00779
4	IEEE 488 RCVR CONT	[illegible]	553122-1	00779
3	VOLTAGE SELECTOR	S2	[illegible]	82389
2	VIDEO OUTPUT	J4	[illegible]	[illegible]
1	AC INPUT	FL	[illegible]	[illegible]

Figure 2-17. WJ-8610A-1, Outline Drawing
Schematic Diagram 580421 (A)


19.00
1.78
.19
23.28
5.22
1.74
19.81
CENTERLINE DIMENSION FOR CHASSIS SLIDE MTG. HOLES
.050
1.50
.71
4.90
3.80
2.45
1.10
J11
RECEIVER 1
J12
RECEIVER 2
J8
X OUT
J1
RCVR CONT
J13
RECEIVER 3
J14
RECEIVER 4
J9
Y OUT
J3
RS232 PORT
J5
AUDIO IN
J6
AUDIO OUT
J10
Z OUT
J2
RMT CONT
F1 AMP
AC IN
J4
VIDEO OUT
110V S2 220V
GND
5.70
2.95
1.70
.60
.11
1.960
3.88
5.78
7.88
12.05
14.88
1.06
16.88

15	AUDIO INPUT	J5	[illegible]	72982
14	RECEIVER 3 SCAN DATA INPUT	J13	56-701-013	33095
13	RECEIVER 1 SCAN DATA INPUT	J11	56-701-013	33095
12	AUDIO OUTPUT	J6	[illegible]	72982
11	RECEIVER 4 SCAN DATA INPUT	J14	56-701-013	33095
10	RECEIVER 2 SCAN DATA INPUT	J12	56-701-013	33095
9	Z OUTPUT	J10	52-706-501	33095
8	Y OUTPUT	J9	52-706-501	33095
7	X OUTPUT	J8	52-706-501	33095
6	IEEE 488 RMT CONT	J2	553122-1	00779
5	RS232 PORT	J3	[illegible]	00779
4	IEEE 488 RCVR CONT	J1	553122-1	00779
3	VOLTAGE SELECTOR	S2	[illegible]	82389
2	VIDEO OUTPUT	J4	[illegible]	[illegible]
1	AC INPUT	F1	[illegible]	[illegible]
NO.	FUNCTION	REF DES	DESCRIPTION	CODE IDENT

Figure 2-17. WJ-8610A-1, Outline Drawing
Schematic Diagram 580421 (A)

SECTION III

REPLACEMENT PARTS LIST

SECTION III

REPLACEMENT PARTS LIST

3.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules) and parts. An example of the unit numbering method follows:

Subassembly Designation A1	R1 Class and No. of Item
Identify from right to left as:	First (1) resistor (R) of First (1) subassembly (A)

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

3.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parentheses within the figure titles.

3.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
00779	AMP, Incorporated P.O. Box 3608 Harrisburg, PA 17105
01295	Texas Instruments 13500 North Central Expressway Dallas, TX 75231
02735	RCA Corporation 1201 South 2nd Street Milwaukee, WI 53204
02777	Hopkins Engineering Co. 12900 Foothill Blvd. San Fernando CA 91342
04099	Capco Incorporated P.O. Box 2164 Grand Junction, CO 81501
04713	Motorola, Incorporated 5005 East McDowell Road Phoenix, AZ 80058
06776	Roberson-Nugent, Inc. 800E 8th Street P.O. Box 1208 New Albany, IN 47150
08108	Lamp Industry for Use with Industry Designations for Lamps

Mfr. Code	Name and Address
09021	Airco Electronics Bradford, PA 16701
13050	Potter Co. A Varian Division 942 Hwy 51N P.O. Box 337 Wesson, MS 39191
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, MD 20878
17856	Siliconix, Inc. 2201 Laurel Wood Road Santa Clara, CA 95050
18324	Signetics Corporation 811 East Arquest Avenue Sunnyvale, CA 94086
22526	Berg Electronics Route 83 New Cumberland, PA 17070
23936	Pamotor Div. William Prudy Co. 770 Airport Blvd. Burlingame, CA 94010
24355	Analog Devices, Inc. P.O. Box 280 Norwood, MA 02062
25088	Siemens Corporation 186 Wood Ave. S. Iselin, NJ 08830
27014	National Semi-Conductor Corp. 2950 San Ysidro Way Santa Clara, CA 95051
27264	Molex Inc. 2222 Wellington Court Lisle, IL 60532
28480	Hewlett-Packard, Co. 1501 Page Mill Road Palo Alto, CA 94304
33095	Spectrum Control, Inc. 152 E. Main Street Fairview, PA 16415
34899	Fair-Rite Products Corp. 1 Commercial Row Wallkill, NY 12589
50364	Monolithic Memories, Inc. 1165 E. Arques Ave. Sunnyvale, CA 94086
51167	Aries Electronics Inc. 62 Trenton Ave. P.O. Box 130 Frenchtown, NJ 08825
51406	Murata Erie North America, Inc. 1148 Franklin Rd., SE Marietta, GA 30067
51642	Centre Eng. 2820 E. College Ave. St. College, PA 16801
54407	Power-One, Inc. 740 Calle Plano Drive Camarillo, CA 93010
56289	Sprague Electronic Company Marshall Street North Adams, MA 01247
58589	Ziatech Corp. 2410 Broadstreet San Luis Obispo, CA 93401
59660	Tusonix Inc. 2155 N. Forbes Blvd. Suite 107 Tuscon, AZ 85745

Mfr. Code	Name and Address
59730	The Thomas and Belts Co. 36 Butler Street Elizabeth, NJ 07207
6R308	Carpac 25 Dubon Ct. Farmington, NY 11735
62786	Hitachi America 1800 Bering Dr. San Jose, CA 95122
70903	Belden Corporation 415 South Patrick Chicago, IL 60644
71279	Cambridge Thermionic Corp. 445 Concord Ave. Cambridge, MA 02138
71785	TRW Electronics Components 1501 Morse Avenue Elk Grove Village, IL 60007
72982	Erie Technological Products, Inc. 2155 North Forbes, Suite 10718 Tucson, AZ 85705
73138	Beckman Instruments, Inc. 2500 Harbor Blvd. Fullerton, CA 92634
79515	EMCO Wheaton, Inc. Union, NJ
80131	Electronics Industries Assoc. Washington, DC 20036
80294	Bourns, Inc. 6135 Magnolia Ave. Riverside, CA 92506
81349	Military Specifications
81350	Joint Army-Navy Specifications
82389	Switchcraft, Inc. 5555 North Elston Ave. Chicago, IL 60630
87034	Marco-Oak Industries 207 South Helina St. Anaheim, CA 92803
91506	Augat, Inc. 33 Perry Ave. Attleboro, MA 02703
92825	Whitso Incorp. 9330 Byron Stret Schiller Park, IL 60176
99800	American Precision Industries Inc. Delevan Division 270 Quaker Rd. East Aurora, NY 14052

3.4 PARTS LIST

The parts list which follows contains all electrical parts used in the equipment and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from the Watkins-Johnson Company, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in **paragraph 3.3** and the manufacturer's part number for components are included as a guide to the user of the equipment in the field. These parts may not necessarily agree with the parts installed in the equipment; however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improved semiconductors become available, it is the policy of Watkins-Johnson to incorporate them in proprietary products. For this reason some transistors, diodes and integrated circuits installed in the equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

3.5 TYPE WJ-8610A-1, CONTROLLER MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Controller Switch Bank Card	1	796469-2	14632	
A2	Front Panel Display	1	796494-1	14632	
A3	Front Panel Display Driver Logic	1	796474-1	14632	
A4A	Mother Board Assy	2	796492-1	14632	
A4B	Same as A4A				
A4A1	Processor/Decoder	1	281139-1	14632	
A4A2	Std Bus Front Panel Control	1	796365-1	14632	
A4A3	IEEE 488 Interface	1	ZT7488-28	58589	
A4A4	IEEE 488 Interface	1	280839-1	14632	
A4A5	CRT Controller	1	280841-1	14632	
A4A6	7911/RP64 16K RAM	1	280842-1	14632	
A4A7	CRC/Real Time Clock	1	281106-1	14632	
A4A8	Spare				
A4A9	Spare				
A4A10	Audio Amplifier Assy	1	796463-1	14632	
A4A11	Processor/Decoder/Modified	1	281184-1	14632	
A4A12	Spare				
A4A13	DRD Control		796479-1	14632	
A4A14	Character Generation/XY Driver		796480-1	14632	
A4A15	Receiver Control		796481-1	14632	
A4A16	Receiver Collection 1	4	796482-1	14632	
A4A17	Receiver Collection 2		796482-1	14632	
A4A18	Receiver Collection 3		796482-1	14632	
A4A19	Receiver Collection 4		796482-1	14632	
A4A20	Spare				
A5	Not Used				
A6	Not Used				
A7	Modification, CRT	1	380902-1	14632	
B1	Blower Fan	1	8112	23936	
C1	Capacitor, Ceramic, Feedthru: .05 µF, 300 V	7	54-785-005-503P	33095	
C2 Thru C5	Same as C1				
C6	Not Used				
C7	Same as C1				
C8	Same as C1				
C9	Capacitor, Ceramic, Feedthru: 100 pF, ±20%, 200 Vdc	3	54-790-001-101M	33095	
C10	Same as C9				
C11	Same as C9				
C12	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	1	34453-1	14632	
C13	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	1	34475-1	14632	
C14	Capacitor, Electrolytic, Tantalum: 100 µF, 10%, 20V	1	CS13BE107K	81349	

MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C15	Capacitor, Electrolytic, Tantalum: 27 µF, 10%, 35 V	1	196D276X9035TE4	56289	
DS1	Lamp/Incandescent				
FB1	Ferrite Core	2	2643163951	34899	
FL1	Line Filter	1	611G3	98310	
FL2	RFI Filter	1	F85069	02777	
FL3	Filter, EMI	4	52-706-301	33095	
FL4	Filter, EMI, RFI	2	1240-030-0000	72982	
FL5	Same as FL4				
FL6 Thru FL8	Same as FL3				
J1	Connector, Receptacle	2	553122-1	00779	
J2	Same as J1				
J3	Connector, Receptacle	1	206770-1	00779	
J4	Part of FL3				
J5	Part of FL4				
J6	Part of FL5				
J7	Phone Jack	1	L-112B	82389	
J8	Part of FL6				
J9	Part of FL7				
J10	Part of FL8				
J11	Connector, Receptacle, EMI	4	56-701-013	33095	
J12	Connector, Receptacle, EMI		56-701-013	33095	
J13	Connector, Receptacle, EMI		56-701-013	33095	
J14	Connector, Receptacle, EMI		56-701-013	33095	
L1	Coil, Toroidal	1	20681-129	14632	
P1	Connector, Plug	3	87456-6	00779	
P2	Same as P1				
P3	Same as P1				
P4	Housing Connector	1	1-87456-6	00779	
P5	Connector	1	251-10-30-160	71785	
P6	Connector, Plug Kit	4	1-88475-0	00779	
P7	Same as P6				
P8	Connector, Plug	1	87499-5	00779	
P9	Connector, Plug Kit	2	88476-7	00779	
P10	Same as P9				
P11	Connector, Plug Kit	2	88476-6	00779	
P12	Same as P11				
P13	Connector, Plug Kit	2	1-88476-1	00779	
P14	Connector	1	87499-9	00779	
P15	Connector/Receptacle	1	87159-5	00779	
P16	Connector/Receptacle	1	745668-2	00779	

MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
P17	Same as P13				
P18	Connector/Plug	1	609-2601M	15912	
P19	Same as P18				
P20	Housing, Connector	1	87456-6	00779	
P21	Connector/Board	4	09-50-3081	27264	
P22 Thru P24	Same as P21				
P25	Connector, Board	2	22-01-2067	27264	
P26	Same as P25				
P27	Connector, Housing	2	499568-7	00779	
P28	Same as P27				
P29	Connector, Receptacle	2	745668-2	00779	
P30	Same as P29				
P31	Connector, Plug	2	65043-035	22526	
P32	Connector, Plug	1	65039-029	22526	
P33	Same as P31				
P34 Thru P36	Not Used				
P37	Connector, Plug	8	65043-034	22526	
P38 Thru P40	Same as P37				
P41	Connector, Plug	4	65039-029	22526	
P42	Same as P37				
P43	Connector, Plug		65039-029	22526	
P44	Same as P37				
P45	Connector, Plug		65039-029	22526	
P46	Same as P37				
P47	Connector, Plug		65039-029	22526	
P48	Same as P37				
P49	Connector/Plug	1	50-328-3875-91	98291	
PS1	Power Supply	1	SPL53-4000	54407	
R1	Potentiometer Modified	1	180401-4	14632	
R2	Potentiometer Modified	1	180401-3	14632	
R3	Resistor, Fixed, Film: 75Ω, 5%, 1/4 W	1	CF1/4-75 OHMS/J	09021	
R4	Potentiometer Modified	1	180401-1	14632	
S1	Switch, Pushbutton	1	671-6-1	87034	
S2	Switch, Slide	1	11A1211	82389	
U1	Encoder Modified	1	290378-1	14632	
U1R1	Resistor, Fixed, Film: 10k 5%, 1/8 W	2	CF1/8-10K/J	09021	
U1R2	Same as U1R1				

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REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U1	Encoder Modified	1	290378-1	14632	
U1R1	Resistor, Fixed, Film: 10k 5% 1/8 W	2	CF1/8-10K/J	09021	
U1R2	Same as U1R1				
W1	Cable Assembly	1	380589-1	14632	
W2	Cable Assembly	1	380589-3	14632	
W3	Cable Assembly	1	380589-2	14632	
W4	Cable Assembly	1	380848-1	14632	
W5	Cable Assembly	1	380590-1	14632	
W6	Cable Assembly	1	380590-2	14632	
W7	Cable Assembly	1	380847-1	14632	
W8	Cable Assembly	1	380880-1	14632	
W9	Cable Assembly	1	280766-1	14632	
W10	Cable Assembly	1	281019-1	14632	
W11	Cable Assembly	1	380878-1	14632	
W12	Cable Assembly	1	380877-1	14632	
W13	Cable Assembly	1	380873-1	14632	
W14	Cable Assembly	1	380873-2	14632	
W15	Cable Assembly	1	380873-3	14632	
W16	Cable Assembly	1	380873-4	14632	
W17	Cable Assembly	1	281020-1	14632	
W18	Cable Assembly	1	380871-1	14632	
W19	Cable Assembly	1	380871-2	14632	
W20	Cable Assembly	1	380871-3	14632	
W21	Cable Assembly	1	380871-4	14632	
W22	Cable Assembly	1	380879-1	14632	

3.5.1 TYPE 796469-2 CONTROLLER SWITCH BANK CARD REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 1 µF 20% 50 V	3	34475-1	14632	
C2	Same as C1				
C3	Same as C1				
C4	Capacitor, Ceramic, Disc: .01 µF 20% 50 V	1	34453-1	14632	
C5	Capacitor, Electrolytic, Tantalum: 22 µF 20% 50 V	1	196D226X0010JE3	56289	
CR1	Diode	1	HLMP-1301	28480	
J1	Connector, Receptacle	1	872270	00779	
J2	Connector, Receptacle	1	1-87227-7	00779	
L1	Coil/Fixed 680 µH 10%	1	553-3635-35	71279	
S1	Switch, Marked	1	381112-1	14632	
S2	Switch, Marked	1	381112-2	14632	
S3	Switch, Marked	1	381112-3	14632	
S4	Switch, Marked	1	381112-4	14632	
S5	Switch, Marked	1	381112-5	14632	
S6	Switch, Marked	1	381112-6	14632	
S7	Switch, Marked	1	381112-7	14632	
S8	Switch, Marked	1	381112-8	14632	
S9	Switch, Marked	1	381112-9	14632	
S10	Switch, Marked	1	381112-10	14632	
S11	Switch, Marked	1	381112-11	14632	
S12	Switch, Marked	1	381112-12	14632	
S13	Switch, Marked	1	381112-13	14632	
S14	Switch, Marked	1	381112-14	14632	
S15	Switch, Marked	1	381112-15	14632	
S16	Switch, Marked	1	381112-16	14632	
S17	Switch, Marked	1	381112-17	14632	
S18	Switch, Marked	1	381112-18	14632	
S19	Switch, Marked	1	381112-19	14632	
S20	Switch, Marked	1	381112-20	14632	
S21	Switch, Marked	1	381112-21	14632	
S22	Switch, Marked	1	381112-22	14632	
S23	Switch, Marked	1	381112-23	14632	
S24	Switch, Marked	1	381112-24	14632	
S25	Switch, Marked	1	381112-25	14632	
S26	Switch, Marked	1	381112-26	14632	
S27	Switch, Marked	1	381112-27	14632	
S28	Switch, Marked	1	381112-28	14632	
S29	Switch, Marked	1	381112-29	14632	
S30	Switch, Marked	1	381112-30	14632	
S31	Switch, Marked	1	381112-31	14632	
S32	Switch, Marked	1	381112-32	14632	
S33	Switch, Marked	1	381112-33	14632	

REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
S34	Switch, Marked	1	381112-34	14632	
S35	Switch, Marked	1	381112-35	14632	
S36	Switch, Marked	1	381112-36	14632	
S37	Switch, Marked	1	381112-37	14632	
S38	Switch, Marked	1	381112-38	14632	
S39	Switch, Marked	1	381112-39	14632	
S40	Switch, Marked	1	381112-40	14632	
S41	Switch, Marked	1	381112-41	14632	
S42	Switch, Marked	1	381112-42	14632	
S43	Switch, Marked	1	381112-43	14632	
S44	Switch, Marked	1	381112-44	14632	
S45	Switch, Marked	1	381112-45	14632	
S46	Switch, Marked	1	381112-46	14632	
S47	Switch, Marked	1	381112-47	14632	
S48	Switch, Marked	1	381112-48	14632	
S49	Switch, Marked	1	381112-49	14632	
U1	Integrated Circuit	5	SN74LS374N	01295	
U2 Thru U5	Same as U1				

3.5.2 TYPE 796494-1 FRONT PANEL DISPLAY REF DESIG PREFIX A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 220 µF, 20%, 10 V	1	196D227X0010TE4	56289	
C2	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	5	34475-1	14632	
C3	Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V	3	196D226X0010JE3	56289	
C4	Same as C2				
C5	Same as C3				
C6	Same as C2				
C7	Same as C2				
C8	Same as C3				
C9	Same as C2				
J1	Terminal, Strip	1	65610-124	22526	
U1*	Display, Alpha-Numerical	7	DL3416	25088	
U2 Thru U7	Same as U1				

*Use only adjacent intensity codes for U1 thru U7.

3.5.3 TYPE 796474-1 FRONT PANEL DRIVE LOGIC REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	8	34453-1	14632	
C2	Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V	11	34475-1	14632	
C3	Same as C1				
C4	Capacitor, Electrolytic, Aluminum: 1000 µF, 6.3 Vdc 20%,	3	CRE1000-6.3	6R308	
C5	Same as C4				
C6	Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V	2	34452-1	14632	
C7	Same as C1				
C8	Capacitor, Ceramic, Monolithic: 100 pF, ±2%, 100 V	2	200-100-NPO-101G	51642	
C9	Same as C8				
C10	Same as C2				
C11	Capacitor, Electrolytic, Tantalum: 100 µF, 10%, 10 V	1	196D107X001PE4	56289	
C12	Same as C1				
C13	Capacitor, Ceramic, Disc: 1 µF, 20%, 50 V	2	8131-050-651-105M	59660	
C14	Same as C2				
C15	Same as C6				
C16	Capacitor, Electrolytic, Tantalum: 3.3 µF, 20%, 35 V	1	196D335X0035JE3	56289	
C17	Same as C1				
C18 Thru C20	Same as C2				
C21	Same as C13				
C22	Same as C1				
C23	Same as C2				
C24	Same as C1				
C25	Same as C2				
C26	Capacitor, Electrolytic, Tantalum: 2.2 µF, 20%, 35 V	1	196D225X0035JE3	56289	
C27	Same as C1				
C28	Same as C2				
C29	Capacitor, Electrolytic, Tantalum: 220 µF, 20%, 10 V	1	196D227X0010TE4	56289	
C30	Same as C2				
C31	Not used				
C32	Same as C4				
C33	Same as C2				
C34	Capacitor, Electrolytic, Tantalum: 10 µF, 20%, 20 V	1	196D106X0020JE3	56289	
CR1	Diode	8	1N914/JAN	81350	
CR2 Thru CR8	Same as CR1				
J1	Connector, Receptacle	1	1-87227-7	00779	
J2	Connector, Receptacle	1	1-87227-2	00779	
J3	Connector, Receptacle	1	1-87227-4	00779	
J4	Connector, Receptacle	1	87160-6	00779	

REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
J5	Connector/Receptacle	1	87224-3	00779	
J6	Connector/Receptacle	1	87224-5	00779	
J7	Connector/Receptacle	1	2-87227-0	00779	
LS1	Alarm, miniature	1	PKM24-4AO	51406	
L1	Coil, Fixed: 68 μH, 10%,	1	553-3635-23	71279	
L2	Coil, Fixed: 680 μH, 10%,	2	553-3635-35	71279	
L3	Same as L2				
Q1	Transistor	1	2N4921	80131	
R1	Not Used				
R2	Resistor, Fixed, Film: 1.0kΩ, 5%, 1/8 W	2	CF1/8-1.0K/J	09021	
R3	Resistor, Fixed, Film: 6.8kΩ, 5%, 1/8 W	1	CF1/8-6.8K/J	09021	
R4	Resistor, Fixed, Film: 10kΩ, 5%, 1/8 W	4 ~~8~~	CF1/8-10K/J	09021	
R5	Same as R4				
R6	Resistor, Fixed, Film: 2kΩ, 5%, 1/8 W	3	CF1/8-2K/J	09021	
R7	Resistor, Fixed, Film: 15kΩ, 5%, 1/8 W	1	CF1/8-15K/J	09021	
R8	Same as R6				
R9	Resistor, Fixed, Film: 2.2kΩ, 5%, 1/8 W	2	CF1/8-2.2K/J	09021	
R10	Same as R9				
R11	Same as R4				
R12	Same as R4				
R13	Resistor, Fixed, Film: 20 kΩ, 5%, 1/8 W	1	CF1/8-20K/J	09021	
R14	Resistor, Fixed, Film: 3.9kΩ, 5%, 1/8 W	2	CF1/8-3.9K/J	09021	
R15	Same as R6				
R16	Same as R2				
R17	Resistor, Fixed, Film: 270Ω, 5%, 1/4 W	1	CF1/4-270 OHMS/J	09021	
R18	Resistor, Fixed, Film: 200Ω, 5%, 1/4 W	1	CF1/4-200 OHMS/J	09021	
R19	Resistor, Fixed, Film: 2.7Ω, 5%, 1/4 W	1	CF1/4-2.7 OHMS/J	09021	
R20	Same as R14				
U1	Integrated Circuit	1	SN74LS373N	01295	
U2	Integrated Circuit	1	SN74LS75N	01295	
U3	Integrated Circuit	2	SN74LS137N	01295	
U4	Integrated Circuit	2	SN74LS123N	01295	
U5	Integrated Circuit	3	SN74LS244N	01295	
U6	Integrated Circuit	1	SN74LS11N	01295	
U7	Same as U4				
U8	Integrated Circuit	1	SN74LS629N	01295	
U9	Integrated Circuit	1	SN74LS393N	01295	
U10	Integrated Circuit	1	MM74C14N	27014	
U11	Integrated Circuit	1	SN74LS174N	01295	
U12	Same as U5				
U13	Same as U5				
U14	Integrated Circuit	1	MM74C20N	27014	

REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U13	Same as U5				
U14	Integrated Circuit	1	MM74C20N	27014	
U15	Resistor, Network	1	4310R-101-104	80294	
U16	Integrated Circuit	1	MM74C923N	27014	
U17	Same as U3				

3.5.4 **TYPE 796492-1 MOTHERBOARD ASSEMBLY** REF DESIG PREFIX **A4A, A4B**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A4A	Motherboard, Modified	1	380824-1	14632	
A4B	Same as A4A				

3.5.4.1 Type 796365-1 Standard Bus Front Panel Control

REF DESIG PREFIX **A4A2**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: .1 µF 20% 50 V	13	34475-1	14632	
C2	Capacitor, Ceramic, Disc: .01 µF 20% 50 V	12	34453-1	14632	
C3	Same as C1				
C4	Same as C2				
C5	Same as C1				
C6	Same as C2				
C7	Same as C2				
C8	Same as C1				
C9	Same as C2				
C10	Same as C1				
C11	Same as C2				
C12	Same as C1				
C13	Same as C1				
C14	Same as C2				
C15	Same as C1				
C16	Same as C2				
C17	Same as C1				
C18	Same as C2				
C19	Same as C1				
C20	Same as C2				
C21	Same as C1				
C22	Same as C2				
C23	Same as C1				
C24	Capacitor, Electrolytic, Tantalum: 47 µF 20% 20 V	1	196D476X0020PE4	56289	
C25	Same as C2				
C26	Same as C1				
CR1	Diode	1	5082-2800	28480	
JW1	Wire, Electrolytic, Buss	AR	8021 22AWG Busswire	70903	
JW2	Same as JW1				
J1	Connector, Receptacle	1	65624-128	22526	
J2	Connector, Receptacle	1	65624-110	22526	
Q1	Transistor	1	2N2222A	80131	
R1	Resistor, Fixed, Film: 2K 5% 1/8 W	3	CF1/8-2K/J	09021	
R2	Resistor, Fixed, Film: 1.0K 5% 1/8 W	9	CF1/8-1.0K/J	09021	
R3	Same as R2				
R4	Same as R2				
R5	Resistor, Fixed, Film: 750K 5% 1/8 W	1	CF1/8-750K/J	09021	
R6	Same as R1				
R7	Resistor, Fixed, Film: 910K 5% 1/8 W	1	CF1/8-910K/J	09021	
R8	Resistor, Fixed, Film: 510Ω 5% 1/8 W	1	CF1/8-510ΩS/J	09021	
R9	Resistor, Fixed, Film: 13.3K 1% 1/10 W	1	RN55C1332F	81349	
R10	Resistor, Fixed, Film: 4.64K 1% 1/10 W	1	RN55C4641F	81349	

REF DESIG PREFIX **A4A2**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R11	Same as R1				
R12 Thru R17	Same as R2				
U1	Integrated Circuit	3	SN74LS373N	01295	
U2	Integrated Circuit	2	SN74LS374N	01295	
U3	Same as U2				
U4	Integrated Circuit	1	SN74LS174N	01295	
U5	Integrated Circuit	2	SN74LS74N	01295	
U6	Integrated Circuit	1	MM74HC74N	27014	
U7	Same as U1				
U8	Integrated Circuit	3	SN74LS32N	01295	
U9	Same as U8				
U10	Same as U1				
U11	Integrated Circuit	1	CD4020BE	02735	
U12	Integrated Circuit	1	SN74LS38N	01295	
U13	Integrated Circuit	1	841201	14632	
U14	Integrated Circuit	1	SN74LS157N	01295	
U15	Integrated Circuit	1	SN74LS139N	01295	
U16	Integrated Circuit	1	SN74LS148N	01295	
U17	Integrated Circuit	1	SN74LS145N	01295	
U18	Same as U8				
U19	Integrated Circuit	3	SN74LS244N	01295	
U20	Same as U19				
U21	Integrated Circuit	2	SN74LS138N	01295	
U22	Same as U19				
U23	Same as U21				
U24	Same as U5				
U25	Integrated Circuit	1	LM393N	27014	
VR1	Integrated Circuit	1	LM385BZ-1.2	27014	
XU13	Socket, Integrated Circuit	1	ICN-163-S3-T	06776	
XU19	Socket, Integrated Circuit	3	ICN-203-S3-T	06776	
XU20	Same as XU19				
XU22	Same as XU19				

3.5.4.2 **Type 796463-1 Audio Amplifier** REF DESIG PREFIX **A4A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 4.7 μF 20% 35 V	2	196D475X0035JE3	56289	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: .1 μF 20% 50 V	2	34475-1	14632	
C4	Same as C3				
C5	Capacitor, Ceramic, Disc: .01 μF 20% 50 V	2	34453-1	14632	
C6	Same as C5				
C7	Capacitor, Electrolytic, Tantalum: 1 μF 20% 35V	1	196D105X0035HE3	56289	
J1	Connector, Receptacle	1	87571-2	00779	
R1	Resistor, Trimmer, Film: 10K 10% 3/4 W	1	89PR10K	73138	
R2	Resistor, Fixed, Film: 10K 5% 1/4 W	2	CF1/4-10K/J	09021	
R3	Same as R2				
R4	Resistor, Fixed, Film: 56K 5% 1/4 W	1	CF1/4-56K/J	09021	
R5	Resistor, Fixed, Film: 43K 5% 1/4 W	1	CF1/4-43K/J	09021	
R6	Resistor, Fixed, Film: 510Ω 5µ 1/4 W	2	CF1/4-510 OHMS/J	09021	
R7	Same as R6				
R8	Resistor, Fixed, Film 200K 5% 1/4 W	1	CF1/4-200K/J	09021	
U1	Integrated Circuit	1	MC3403P	04713	

3.5.4.3 Type 796479-1 DRD Control REF DESIG PREFIX A4A13

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 22 µF 20% 15 V	1	196D226X0015KE3	56289	
C2	Capacitor, Ceramic, Disc: .1 µF 20% 50 V	11	34475-1	14632	
C3 Thru C12	Same as C2				
C13	Not Used				
C14	Not used				
C15	Capacitor, Ceramic, Disc: .01 µF 20% 50 V	11	34453-1	14632	
C16	Same as C15				
C17	Same as C15				
C18	Not Used				
C19 Thru C25	Same as C15				
C26	Not Used				
C27	Same as C15				
JP1	Connector, Plug	1	ML-100S	51167	
JW1	Wire, Electrical, Buss	AR	8021 22AWG Busswire	70903	
J1	Connector, Modified	1	180486-1	14632	
J2	Connector, Modified	1	180502-1	14632	
J3	Connector, Receptacle	1	65610-116	22526	
U1	Integrated Circuit	1	SN74LS245N	01295	
U2	Integrated Circuit	4	MM74HCT244N	27014	
U3	Integrated Circuit	1	HM6264P-12	62786	
U4	Integrated Circuit	1	MM74HCT573N	27014	
U5	Same as U2				
U6	Integrated Circuit	1	MM74HCt08N	27014	
U7	Integrated Circuit	2	MM74HC163N	27014	
U8	Integrated Circuit	3	SN74LS32N	01295	
U9	Integrated Circuit	1	SN74LS148N	01295	
U10	Integrated Circuit	1	SN74LS04N	01295	
U11	Integrated Circuit	2	MM74HCT10N	27014	
U12	Same as U2				
U13	Same as U2				
U14	Integrated Circuit	1	SN74LS08N	01295	
U15	Integrated Circuit	1	MM74HC4040N	27014	
U16	Same as U11				
U17	Integrated Circuit	1	MM74HCT139N	27014	
U18	Same as U8				
U19	Integrated Circuit	1	SN74LS14N	01295	
U20	Integrated Circuit	1	SN74LS138N	01295	
U21	Integrated Circuit	1	SN74LS244N	01295	
U22	Same as U8				

REF DESIG PREFIX **A4A13**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U23	Same as U7				
U24	Integrated Circuit	2	MM74HCT138N	27014	
U25	Same as U24				
XU3	Socket, Integrated Circuit	1	528AG10D	91506	

3.5.4.4 Type 796480-1 Character Generation/XY Driver Assembly

REF DESIG PREFIX **A4A14**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: .1 µF 20% 50 V	30	34475-1	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, Monolithic: 10± 2% 100 V	4	100-100-NPO-100G	51642	
C4 Thru C8	Same as C1				
C9	Capacitor, Ceramic, Monolithic: 1500 pF ±2% 100 V	1	150-100-NPO-152G	51642	
C10	Capacitor, Ceramic, Monolithic: 9.1 pF, ± .25%, 100 V	2	100-100-NPO-919C	51642	
C11	Same as C1				
C12	Same as C3				
C13	Same as C1				
C14	Same as C1				
C15	Not Used				
C16 Thru C18	Same as C1				
C19	Capacitor/Polycarbonate: 3300 pF 2% 100 V	1	MPCW-332-1-2	04099	
C20	Same as C3				
C21	Capacitor, Ceramic, Monolithic: 430 pF ± 2% 100 V	1	150-100-NPO-431G	51642	
C22	Same as C1				
C23	Same as C1				
C24	Same as C10				
C25 Thru C27	Same as C1				
C28	Same as C3				
C29	Not Used				
C30 Thru C33	Same as C1				
C34	Capacitor, Electrolytic, Tantalum: 2.2 µF 20% 35 V	2	196D225X0035JE3	56289	
C35	Same as C34				
C36	Capacitor, Electrolytic, Tantalum: 22 µF 20% 15 V	3	196D226X0015KE3	56289	
C37 Thru C42	Same as C1				
C43	Not Used				
C44	Capacitor, Ceramic, Disc: .01 µF 20% 50 V	3	34453-1	14632	
C45	Same as C44				
C46 Thru C48	Not Used				
C49	Same as C44				
C50	Same as C1				

REF DESIG PREFIX A4A14

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C50	Same as C1				
C51	Same as C36				
C52	Same as C36				
C53	Same as C1				
C54	Capacitor, Ceramic, Monolithic: 2700 pF, ±2%, 100 V	3	200-100-NPO-272G	51642	
C55	Same as C54				
C56	Same as C54				
J1	Connector, Modified	1	180486-1	14632	
J2	Connector, Modified	1	180484-1	14632	
L1	Coil, Fixed, Mold: 56 μH, 5%,	1	1537-64 (90538-6)	99800	
L2	Coil, Fixed: 270 μH, 10%,	1	1025-78	99800	
R1	Resistor, Fixed, Film: 887Ω, 1%, 0.10 W	1	RN55C8870F	81349	
R2	Resistor, Trimmer, Film: 2kΩ, 10%, 1/2 W	5	62PR2K	73138	
R3	Resistor, Fixed, Film: 51Ω, 5%, 1/4 W	3	CF1/4-51 OHMS/J	09021	
R4	Not Used				
R5	Same as R2				
R6	Same as R3				
R7	Resistor, Fixed, Film: 200Ω, 1%, 1/10 W	1	RN55C2000F	81349	
R8	Resistor, Trimmer, Film: 825Ω, 1%, 1/10 W	1	RN55C8250F	81349	
R9	Resistor, Fixed, Film: 511Ω, 1%, 1/10 W	3	RN55C5110F	09021	
R10	Resistor, Fixed, Film: 270Ω, 5%, 1/8 W	1	CF1/8-270 OHMS/J	09021	
R11	Same as R2				
R12	Resistor, Fixed, Film: 680kΩ, 5%, 1/8 W	1	CF1/8-680K/J	09021	
R13	Same as R2				
R14	Resistor, Fixed, Film: 620Ω, 5%, 1/8 W	1	CF1/8-620 OHMS/J	09021	
R15	Resistor, Fixed, Film: 3.0kΩ, 5%, 1/8 W	1	CF1/8-3.0K/J	09021	
R16	Same as R2				
R17	Not Used				
R18	Resistor, Fixed, Film: 1.0kΩ, 1%, 1/10 W	1	RN5501001F	81349	
R19	Resistor, Fixed, Film: 750Ω, 5%, 1/8 W	1	CF1/8-750 OHMS/J	09021	
R20	Resistor, Fixed, Film: 10kΩ, 1%, 1/10 W	2	RN5501002F	81349	
R21	Resistor, Fixed, Film: 1.6kΩ, 5%, 1/8 W	1	CF1/8-1.6K/J	09021	
R22	Resistor, Fixed, Film: 560Ω, 5%, 1/8 W	2	CF1/80-560 OHMS/J	09021	
R23	Same as R20				
R24	Resistor, Fixed, Film: 10Ω, 5%, 1/4 W	2	CF1/4-10 OHMS/J	09021	
R25	Resistor, Trimmer, Film: 5kΩ, 10%, 1/2 W	1	62PR5K	73138	
R26	Same as R3				
R27	Same as R24				
R28	Same as R22				

REF DESIG PREFIX **A4A14**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U1	Integrated Circuit	3	MM74HCT74N	27014	
U2	Integrated Circuit	1	MM74HC21N	27014	
U3	Integrated Circuit	3	MM74HC163N	27014	
U4	Integrated Circuit	1	MM74HCT08N	27014	
U5	Integrated Circuit	1	MM74HCT04N	27014	
U6	Same as U3				
U7	Same as U1				
U8	Integrated Circuit	1	MM74HC151N	27014	
U9	Resistor, Network	1	765-1-R10K	73138	
U10	Programmed Extrom	1	841180	14632	
U11	Same as U3				
U12	Integrated Circuit	6	AD7524JN	24355	
U13 Thru U17	Same as U12				
U18	Same as U1				
U19	Integrated Circuit	5	LM318N	27014	
U20	Same as U19				
U21	Integrated Circuit	1	MC1458N	18324	
U22	Integrated Circuit	1	TL082ACP	01295	
U23	Same as U19				
U24	Same as U19				
U25	Integrated Circuit	1	DG200ABK	17856	
U26	Integrated Circuit	3	LH0002CN	27014	
U27	Integrated Circuit	1	AD581J	24355	
U28	Same as U19				
U29	Integrated Circuit	1	DG303CJ	17856	
U30	Same as U26				
U31	Same as U26				
XU10	Socket/IC	1	524-AG10D	91506	

3.5.4.5 Type 796481-1 Receiver Collection Control

REF DESIG PREFIX **A4A15**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 22 µF 20% 10 V	1	196D226X0010JE3	56289	
C2	Capacitor, Electrolytic, Disc: .1 µF 20% 50 V	7	34475-1	14632	
C3 Thru C8	Same as C2				
C9	Capacitor, Ceramic, Disc: .01 µF 20% 50 V	8	34453-1	14632	
C10 Thru C16	Same as C9				
J1	Connector, Mod	6	180483-1	14632	
J2 Thru J6	Same as J1				
J7	Connector, Mod	2	180502-1	14632	
J8	Same as J7				
J9	Connector, Receptacle	1	65610-116	22526	
J10	Connector, Receptacle	1	65610-108	22526	
JP1	Connector, Plug	2	ML-100S	51167	
JP2	Same as JP1				
R1	Resistor, Fixed, Film: 2.0K 5% 1/8 W	2	CF1/8-2.0K/J	09021	
R2	Same as R1				
U1	Integrated Circuit	2	MM74HCT574N	27014	
U2	Integrated Circuit	1	MM74HCT373N	27014	
U3	Same as U1				
U4	Integrated Circuit	2	SN74LS54N	01295	
U5	Integrated Circuit	1	SN74LS137N	01295	
U6	Integrated Circuit	3	MM74HCT138N	01295	
U7	Integrated Circuit	1	MM74HCT139N	27014	
U8	Same as U6				
U9	Integrated Circuit	4	MM74HCT74N	27014	
U10	Same as U9				
U11	Resistor, Network	1	765-1-R22K	73138	
U12	Same as U6				
U13	Sames as U9				
U14	Integrated Circuit	1	SN74LS38N	01295	
U15	Same as U4				
U16	Same as U9				

3.5.4.6 **Type 796482-1 Receiver Collection** REF DESIG PREFIX **A4A16-A4A19**

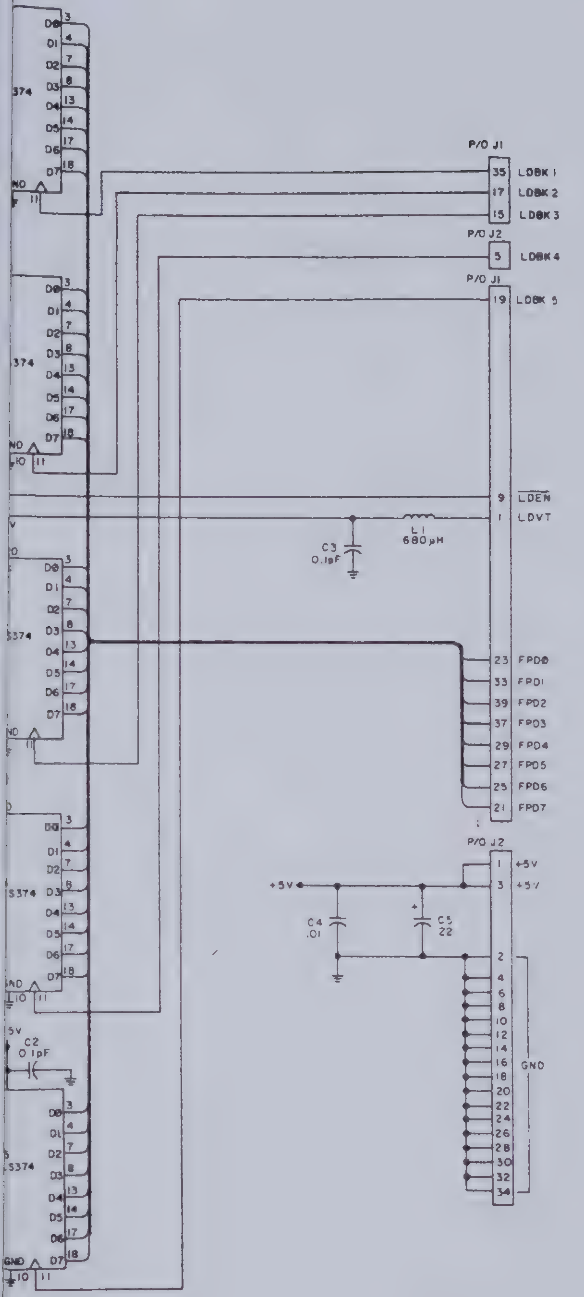
REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: .1 µF 20% 50 V	12	34475-1	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: .01 µF 20% 50 V	16	34453-1	14632	
C4	Capacitor, Ceramic, Mono: 100 pF ±2% 100 V	1	200-100-NPO-101G	51642	
C5	Capacitor, Electrolytic, Tantalum: 22 6F, 20%, 35 V	1	196D226XX0035PE4	56289	
C6 Thru C12	Same as C1				
C13 Thru C27	Same as C3				
C28 Thru C30	Same as C1				
CR1	Diode	1	5082-2800	28480	
J1	Connector, Mod	1	180483-1	14632	
J2	Connector, Mod	1	180484-1	14632	
J3	Connector, Receptacle	1	65610-116	22526	
JW1	Wire, Electrolytic, Buss	AR	8021 22AWG Busswire	70903	
JW2	Same as JW1				
R1	Resistor, Fixed, Film: 2K 5% 1/8 W	1	CF1/8-2K/J	09021	
R2	Resistor, Fixed, Film: 22K 5% 1/8 W	1	CF1/8-22K/J	09021	
R3	Same as R2				
R4	Resistor, Fixed, Film: 1.2K 5% 1/8 W	1	CF1/8-1.2K/J	09021	
R5	Resistor, Fixed, Film: 5.1K 5% 1/8 W	1	CF1/8-5.1K/J	09021	
R6	Resistor, Fixed, Film: 10Ω 5% 1/4 W	1	CF1/4-10 OHMS/J	09021	
R7	Same as R5				
U1	Integrated Circuit	1	MM74HCT245N	27014	
U2	Integrated Circuit	1	ADC0820N	27014	
U3	Integrated Circuit	1	LM358AN	27014	
U4	Integrated Circuit	4	MM74HCT244N	27014	
U5	Integrated Circuit	1	HM6264LP-12	62786	
U6	Integrated Circuit	1	SN74LS00N	01295	
U7	Same as U4				
U8	Integrated Circuit	2	SN74LS74N	01295	
U9	Integrated Circuit	2	SN74LS393N	01295	
U10	Integrated Circuit	2	SN74LS32N	01295	
U11	Integrated Circuit	1	SN74LS08N	01295	
U12	Integrated Circuit	2	SN74LS138N	01295	
U13	Same as U4				
U14	Same as U4				
U15	Same as U9				
U16	Integrated Circuit	3	SN74LS161N	01295	
U17	Integrated Circuit	1	SN74LS11N	01295	

REF DESIG PREFIX **A4A16-A4A19**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U18	Integrated Circuit	1	SN74LS244N	01295	
U19	Same as U12				
U20	Same as U16				
U21	Integrated Circuit	1	SN74LS14N	01295	
U22	Same as U10				
U23	Integrated Circuit	1	SN74LS04N	01295	
U24	Same as U16				
U25	Integrated Circuit	1	SN74LS27N	01295	
U26	Same as U8				
VR1	Integrated Circuit	1	LM3858BZ-2.5	27014	
XU5	Socket, Integrated Circuit	1	528AG10D	91506	

SECTION IV

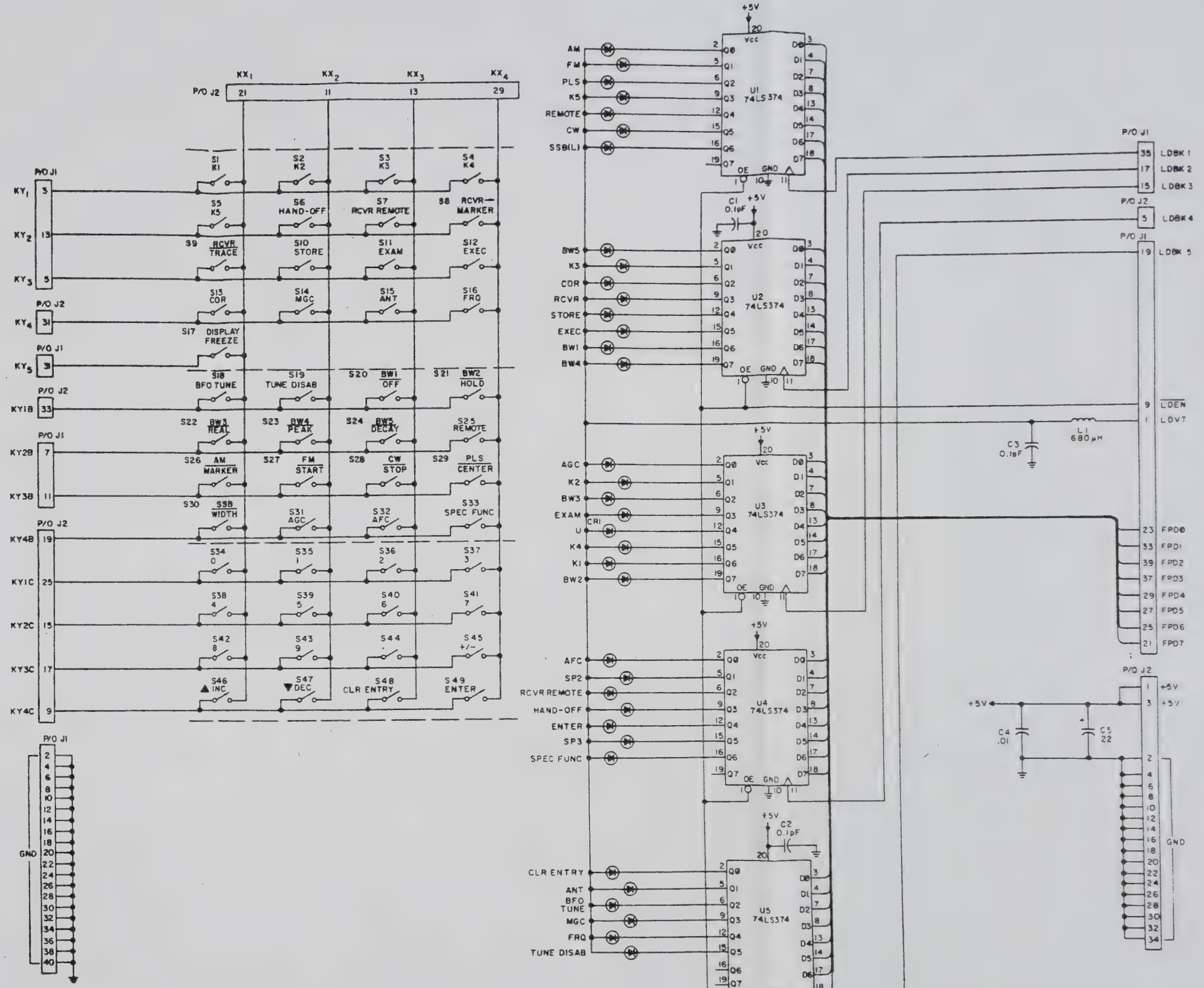
SCHEMATIC DIAGRAMS


D0
D1
D2
D3
D4
D5
D6
D7
374
S374
3
4
7
8
13
14
17
18
GND
10
11
P/O J1
35 LDBK 1
17 LDBK 2
15 LDBK 3
P/O J2
5 LDBK 4
P/O J1
19 LDBK 5
9 LDEN
1 LDVT
L1
680μH
C3
0.1pF
23 FPD0
33 FPD1
39 FPD2
37 FPD3
29 FPD4
27 FPD5
25 FPD6
21 FPD7
P/O J2
1 +5V
3 +5V
+5V
C4
.01
C5
22
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
GND
5V
C2
0.1pF

ure 4-1. Type 796469-2, Switch Bank (A1), Schematic Diagram 580527 (A)

NOTES:
1 UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN µF.

U S L CR C	U5 S49 L1 CR1 C5	
REF DESIG	LAST USED	NOT USED

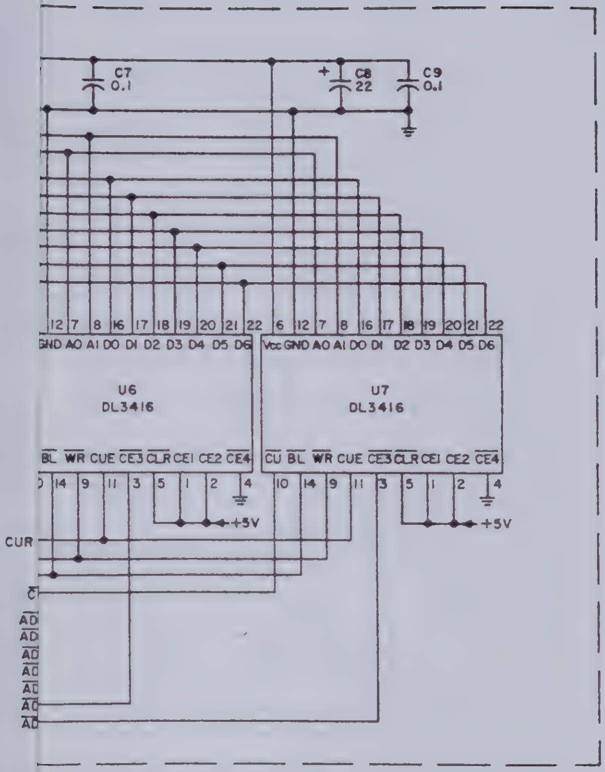


P/O J2
KX1
KX2
KX3
KX4
P/O J1
KY1
KY2
KY3
KY4
KY5
KY1B
KY2B
KY3B
KY4B
KY1C
KY2C
KY3C
KY4C
S1 K1
S2 K2
S3 K3
S4 K4
S5 K5
S6 HAND-OFF
S7 RCVR REMOTE
S8 RCVR-MARKER
S9 RCVR TRACE
S10 STORE
S11 EXAM
S12 EXEC
S13 COR
S14 MGC
S15 ANT
S16 FRQ
S17 DISPLAY FREEZE
S18 BFO TUNE
S19 TUNE DISAB
S20 BW1 OFF
S21 BW2 HOLD
S22 BW3 REAL
S23 BW4 PEAK
S24 BW5 DECAY
S25 REMOTE
S26 AM MARKER
S27 FM START
S28 CW STOP
S29 PLS CENTER
S30 SSB WIDTH
S31 AGC
S32 AFC
S33 SPEC FUNC
S34 0
S35 1
S36 2
S37 3
S38 4
S39 5
S40 6
S41 7
S42 8
S43 9
S44 .
S45 +/−
S46 ▲ INC
S47 ▼ DEC
S48 CLR ENTRY
S49 ENTER
GND
U1 74LS374
U2 74LS374
U3 74LS374
U4 74LS374
U5 74LS374
+5V
C1 0.1µF
C2 0.1µF
C3 0.1µF
C4 .01
C5 22
L1 680µH
CR1
AM
FM
PLS
K5
REMOTE
CW
SSB(L)
BW5
K3
COR
RCVR
STORE
EXEC
BW1
BW4
AGC
K2
BW3
EXAM
U
K4
K1
BW2
AFC
SP2
RCVR REMOTE
HAND-OFF
ENTER
SP3
SPEC FUNC
CLR ENTRY
ANT
BFO TUNE
MGC
FRQ
TUNE DISAB
LDBK 1
LDBK 2
LDBK 3
LDBK 4
LDBK 5
LDEN
LDVT
FPD0
FPD1
FPD2
FPD3
FPD4
FPD5
FPD6
FPD7

Figure 4-1. Type 796469-2, Switch Bank (A1), Schematic Diagram 580527 (A)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN µF.

REF DESIG	HIGHEST USED	NOT USED
C	C9	
U	U7	


C7
0.1
C8
22
C9
0.1
12 7 8 16 17 18 19 20 21 22
GND A0 A1 D0 D1 D2 D3 D4 D5 D6
U6
DL3416
BL WR CUE CE3 CLR CE1 CE2 CE4
14 9 11 3 5 1 2 4
+5V
6 12 7 8 16 17 18 19 20 21 22
Vcc GND A0 A1 D0 D1 D2 D3 D4 D5 D6
U7
DL3416
CU BL WR CUE CE3 CLR CE1 CE2 CE4
10 14 9 11 3 5 1 2 4
+5V
CUR
C
AD
AD
AD
AD
AD
AD
AD

Type 796494-1, Front Panel Display (A2), Schematic Diagram 480714 (A)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN µF.

REF DESIG	HIGHEST USED	NOT USED
C	C9	
U	U7	

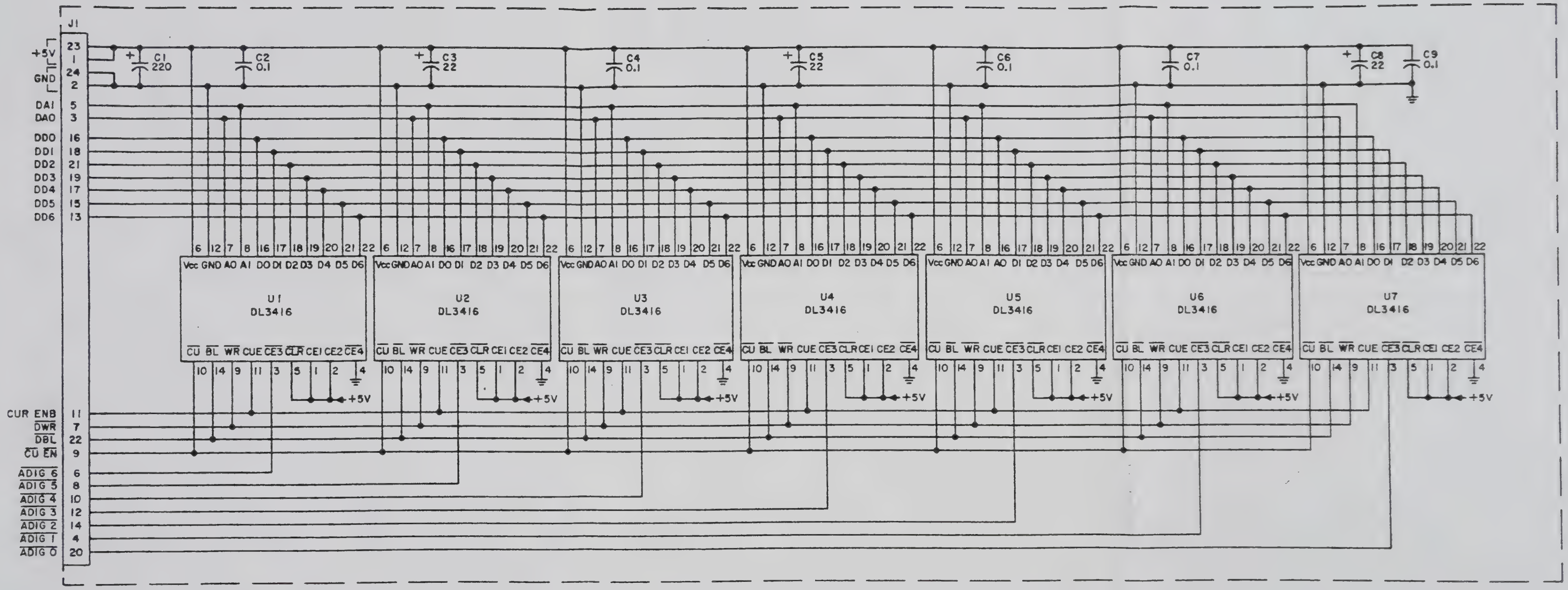
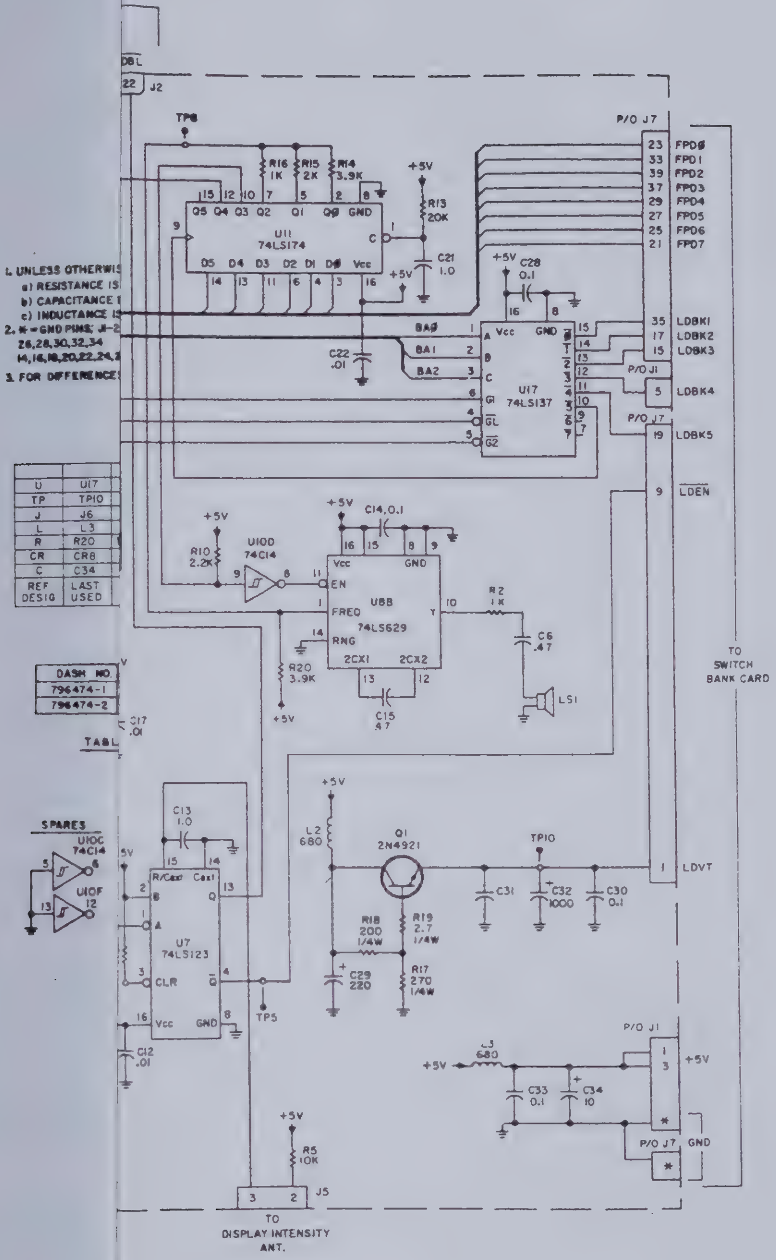

J1
+5V
GND
DA1
DA0
DD0
DD1
DD2
DD3
DD4
DD5
DD6
CUR ENB
DWR
DBL
CU EN
ADIG 6
ADIG 5
ADIG 4
ADIG 3
ADIG 2
ADIG 1
ADIG 0
C1 220
C2 0.1
C3 22
C4 0.1
C5 22
C6 0.1
C7 0.1
C8 22
C9 0.1
U1 DL3416
U2 DL3416
U3 DL3416
U4 DL3416
U5 DL3416
U6 DL3416
U7 DL3416
Vcc GND A0 A1 D0 D1 D2 D3 D4 D5 D6
CU BL WR CUE CE3 CLR CE1 CE2 CE4
+5V

Figure 4-2. Type 796494-1, Front Panel Display (A2), Schematic Diagram 480714 (A)


DBL
22 J2
TP8
R16 1K
R15 2K
R14 3.9K
U11 74LS174
Q5 Q4 Q3 Q2 Q1 Q0 GND
D5 D4 D3 D2 D1 D0 Vcc
+5V
R13 20K
C21 1.0
P/O J7
23 FPD0
33 FPD1
39 FPD2
37 FPD3
29 FPD4
27 FPD5
25 FPD6
21 FPD7
+5V C28 0.1
35 LDBK1
17 LDBK2
15 LDBK3
P/O J1
5 LDBK4
P/O J7
19 LDBK5
9 LDEN
1 LDVT
BA0 BA1 BA2
U17 74LS137
C22 .01
1. UNLESS OTHERWIS
a) RESISTANCE IS
b) CAPACITANCE I
c) INDUCTANCE IS
2. * = GND PINS; J1-2
26,28,30,32,34
14,16,18,20,22,24,2
3. FOR DIFFERENCES
U U17
TP TP10
J J6
L L3
R R20
CR CR8
C C34
REF DESIG LAST USED
DASH NO.
796474-1
796474-2
C17 .01
TABL
SPARES
U10C 74C14
U10F
+5V
R10 2.2K
U10D 74C14
C14, 0.1
U8B 74LS629
Vcc GND EN FREQ RNG 2CX1 2CX2 Y
R2 1K
C6 .47
LS1
R20 3.9K
C15 47
TO SWITCH BANK CARD
C13 1.0
U7 74LS123
R/Cext Cext B A CLR Q Q̄ Vcc GND
TP5
C12 .01
L2 680
Q1 2N4921
TP10
C31
C32 1000
C30 0.1
R18 200 1/4W
R19 2.7 1/4W
C29 220
R17 270 1/4W
P/O J1
L3 680
C33 0.1
C34 10
+5V
P/O J7 GND
R5 10K
J5
TO DISPLAY INTENSITY ANT.

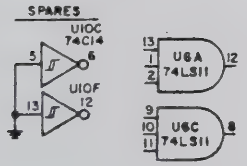
Type 796474-1, Front Panel Driver Logic (A3), Schematic Diagram 580383 (D)

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN µF.
   c) INDUCTANCE IS IN µH.
2. ✱ = GND PINS; J1-2,4,6,8,10,12,14,16,18,20,22,24 26,28,30,32,34 AND J7-2,4,6,8,10,12 14,16,18,20,22,24,26,28,30,32,34,36,38,40.
3. FOR DIFFERENCES BETWEEN DASH NO'S. SEE TABLE A

U	U17	
TP	TP10	
J	J6	
L	L3	
R	R20	R1
CR	CR8	
C	C34	C31
REF DESIG	LAST USED	NOT USED

DASH NO.	R11, R12
796474-1	10K
796474-2	470K

TABLE A


SPARES
U10C
74C14
U10F
U6A
74LS11
U6C
74LS11

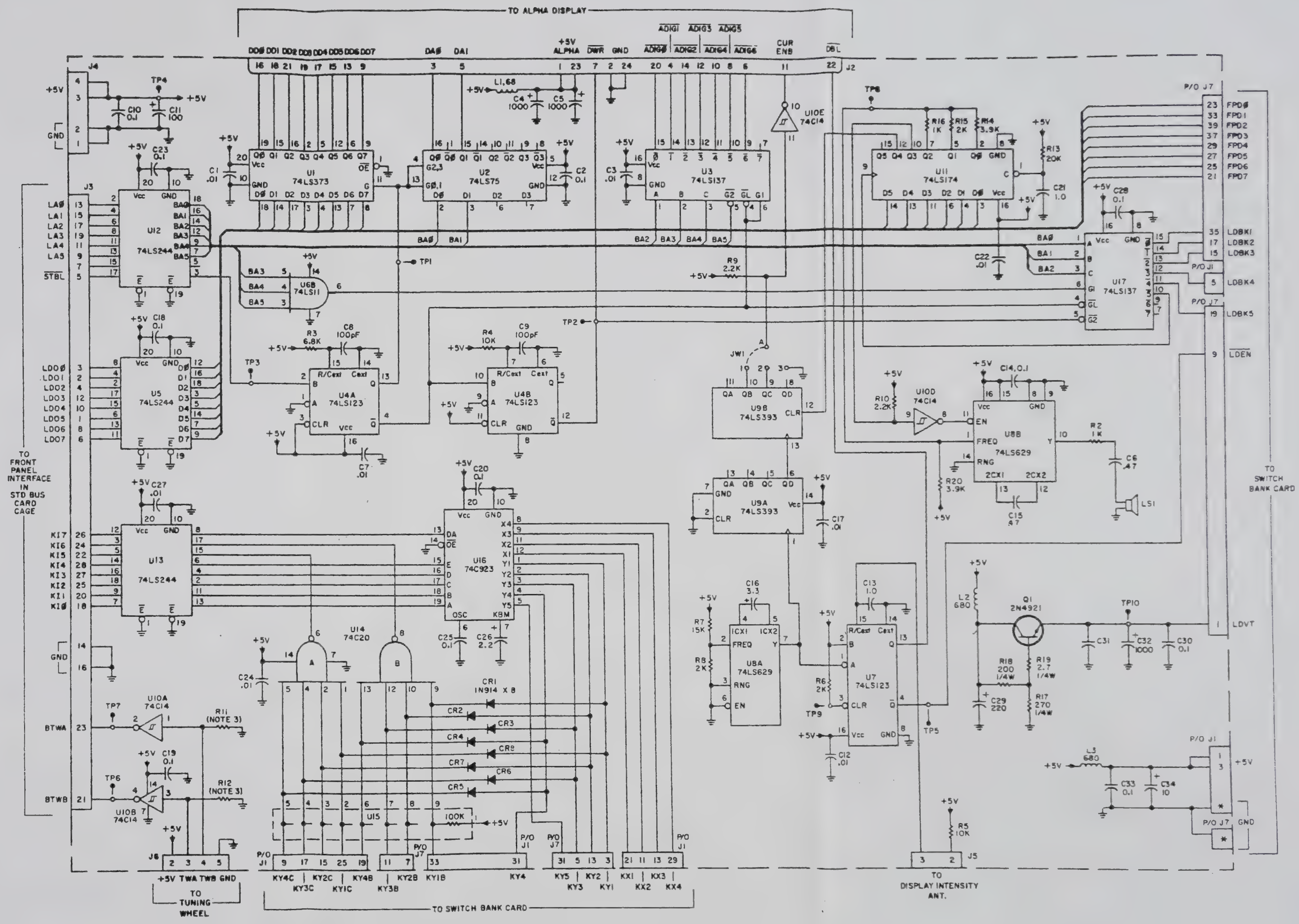
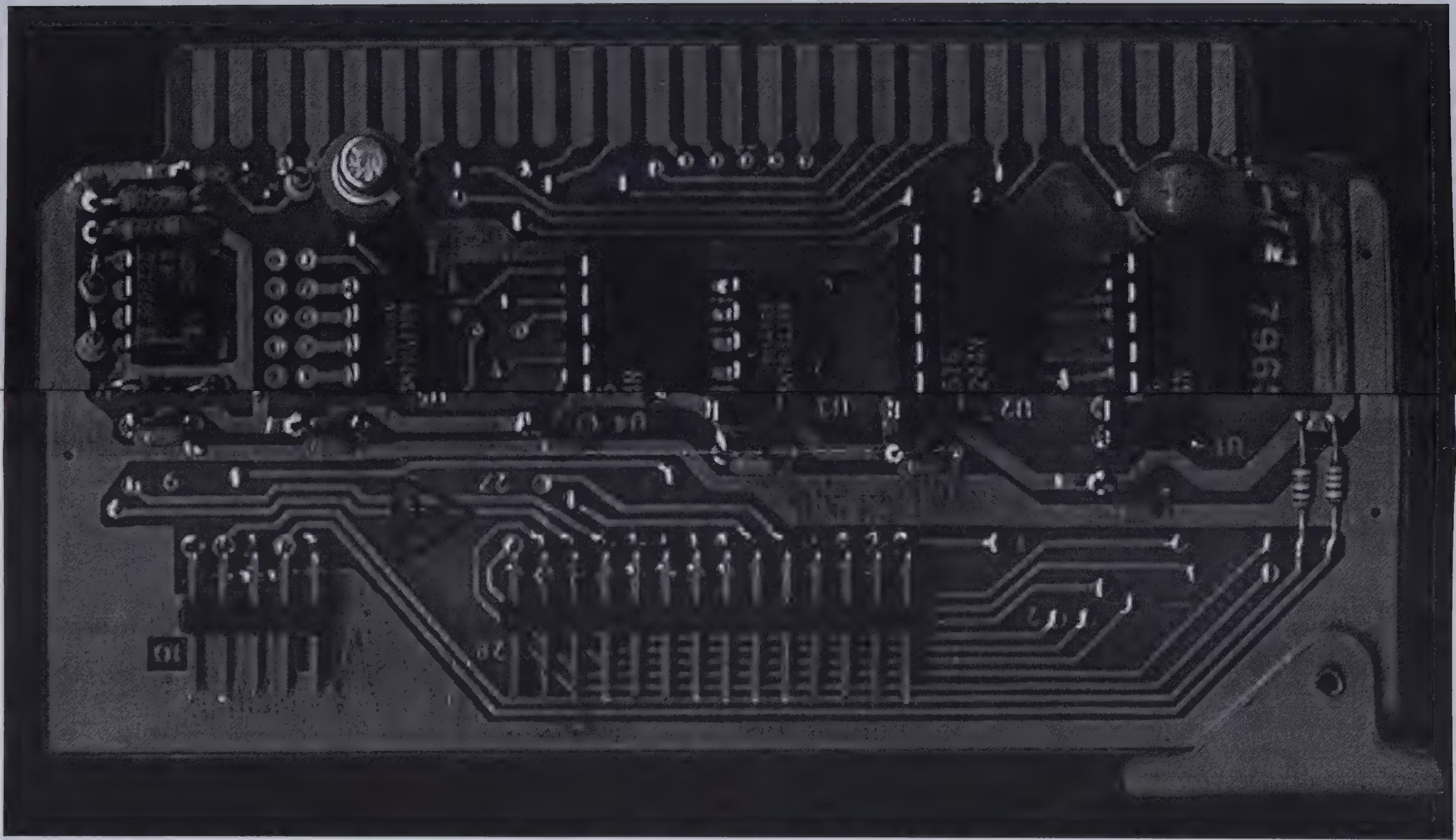
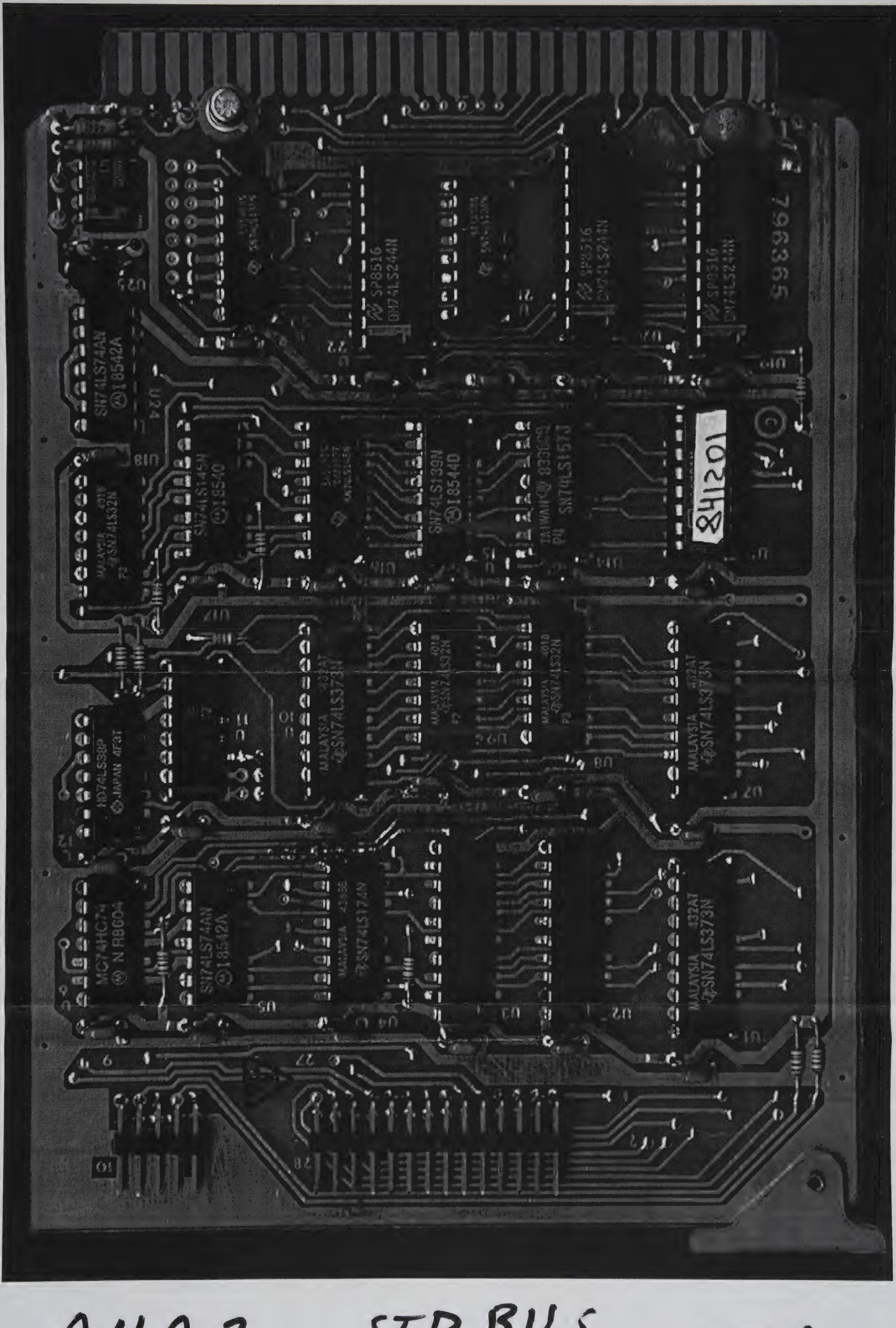

TO ALPHA DISPLAY
J4
+5V
GND
TP4
C10 0.1
C11 100
J3
J2
U12 74LS244
U5 74LS244
U13 74LS244
U1 74LS373
U2 74LS75
U3 74LS137
U11 74LS174
U17 74LS137
U6B 74LS11
U4A 74LS123
U4B 74LS123
U9B 74LS393
U9A 74LS393
U8B 74LS629
U8A 74LS629
U7 74LS123
U16 74C923
U14 74C20
U15
U10A 74C14
U10B 74C14
U10D 74C14
U10E 74C14
Q1 2N4921
LS1
TP1
TP2
TP3
TP5
TP6
TP7
TP8
TP9
TP10
JW1
CR1 1N914 X 8
LA0 LA1 LA2 LA3 LA4 LA5 STBL
LD00 LD01 LD02 LD03 LD04 LD05 LD06 LD07
KI7 KI6 KI5 KI4 KI3 KI2 KI1 KI0
BTWA
BTWB
TO FRONT PANEL INTERFACE IN STD BUS CARD CAGE
DD0 DD1 DD2 DD3 DD4 DD5 DD6 DD7
DA0 DA1
+5V ALPHA DWR GND
ADIG0 ADIG1 ADIG2 ADIG3 ADIG4 ADIG5 ADIG6
CUR ENB
DBL
P/O J7
FPD0 FPD1 FPD2 FPD3 FPD4 FPD5 FPD6 FPD7
LDBK1 LDBK2 LDBK3 LDBK4 LDBK5
LDEN
LDVT
TO SWITCH BANK CARD
J6
+5V TWA TWB GND
TO TUNING WHEEL
KY4C KY3C KY2C KY1C KY4B KY3B KY2B KY1B KY4
KY5 KY3 KY2 KY1 KX1 KX2 KX3 KX4
J5
TO DISPLAY INTENSITY ANT.
P/O J1

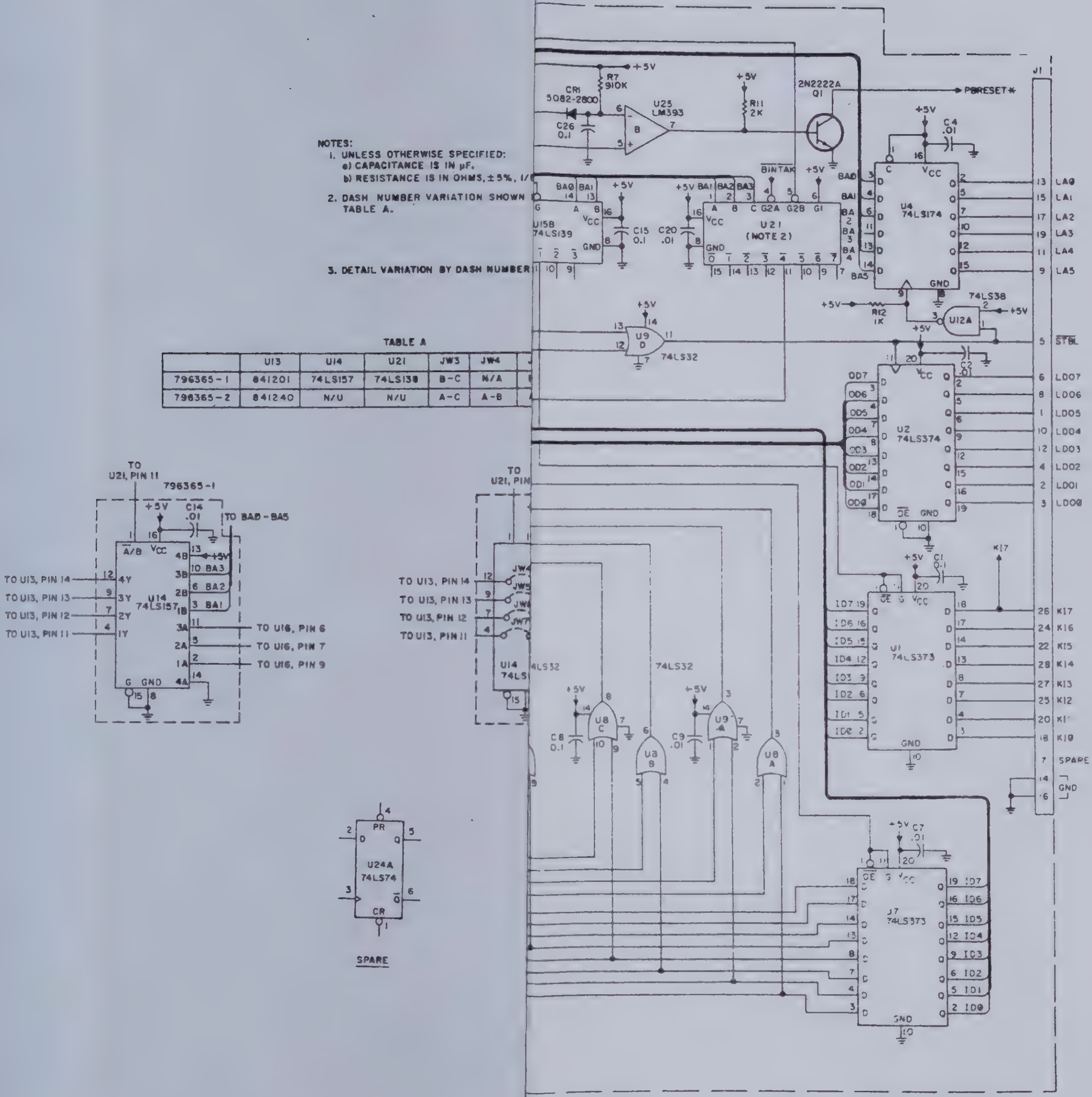
Figure 4-3. Type 796474-1, Front Panel Driver Logic (A3), Schematic Diagram 580383 (D)



A4A2 STD BUS CTLR


796365
841201
SP8516
DM74LS244N
SN74LS139N
SN74LS573
SN74LS145N
SN74LS32N
SN74LS373N
SN74LS174N
SN74LS74AN
HD74LS38P
MC74HC74
U1
U2
U3
U4
U5
U8
U14
U17
U18
U24
U25
28
27
6

A4A2 STD BUS CTLR


+5V
R7
910K
CR1
5082-2800
C26
0.1
U25
LM393
R11
2K
2N2222A
Q1
PBRESET*
C4
.01
U4
74LS174
LA0
LA1
LA2
LA3
LA4
LA5
BINTAK
U15B
74LS139
C15
0.1
C20
.01
U21
(NOTE 2)
BA0
BA1
BA2
BA3
BA4
BA5
74LS38
U12A
R12
1K
U9
D
74LS32
STBL
C2
.01
U2
74LS374
OD7
OD6
OD5
OD4
OD3
OD2
OD1
OD0
LDO7
LDO6
LDO5
LDO4
LDO3
LDO2
LDO1
LDO0
C1
0.1
K17
U1
74LS373
ID7
ID6
ID5
ID4
ID3
ID2
ID1
ID0
K17
K16
K15
K14
K13
K12
K11
K10
SPARE
GND
J1
U8
C
C8
0.1
U8
B
C9
.01
U8
A
74LS32
C7
.01
J7
74LS373
TO
U21, PIN 11
796365-1
C14
.01
TO BA0-BA5
U14
74LS157
TO U13, PIN 14
TO U13, PIN 13
TO U13, PIN 12
TO U13, PIN 11
TO U16, PIN 6
TO U16, PIN 7
TO U16, PIN 9
JW4
JW5
JW6
JW7
U24A
74LS74
SPARE

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN µF.
   b) RESISTANCE IS IN OHMS, ±5%, 1/
2. DASH NUMBER VARIATION SHOWN
   TABLE A.
3. DETAIL VARIATION BY DASH NUMBER

TABLE A

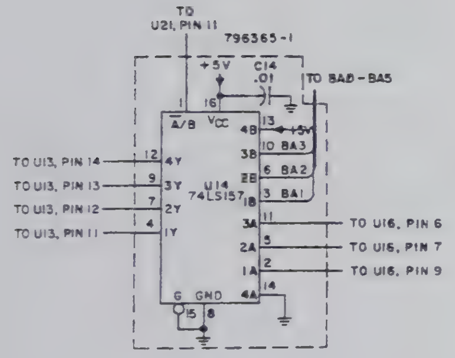
	U13	U14	U21	JW3	JW4
796365-1	841201	74LS157	74LS138	B-C	N/A
796365-2	841240	N/U	N/U	A-C	A-B

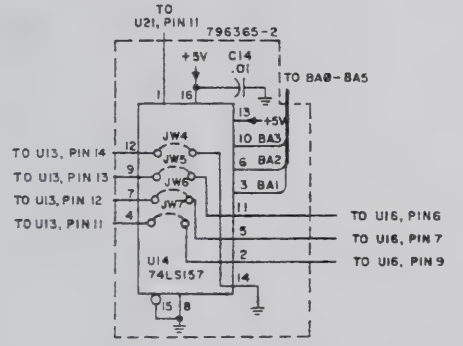
796365-1, Standard Bus Front Panel Control (A4A2),
atic Diagram 580268 (D)

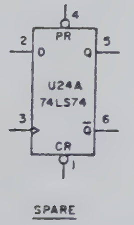
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN µF.
   b) RESISTANCE IS IN OHMS, ±5%, 1/8 W.
2. DASH NUMBER VARIATION SHOWN IN TABLE A.
3. DETAIL VARIATION BY DASH NUMBER:

TABLE A

	U13	U14	U21	JW3	JW4	JW5	JW6	JW7
796365-1	841201	74LS157	74LS138	B-C	N/A	N/A	N/A	N/A
796365-2	841240	N/U	N/U	A-C	A-B	A-B	A-B	A-B


TO U21, PIN 11
796365-1
+5V
C14 .01
TO BA0-BA5
TO U13, PIN 14
TO U13, PIN 13
TO U13, PIN 12
TO U13, PIN 11
U14 74LS157
TO U16, PIN 6
TO U16, PIN 7
TO U16, PIN 9


TO U21, PIN 11
796365-2
+5V
C14 .01
TO BA0-BA5
TO U13, PIN 14
TO U13, PIN 13
TO U13, PIN 12
TO U13, PIN 11
JW4
JW5
JW6
JW7
U14 74LS157
TO U16, PIN6
TO U16, PIN 7
TO U16, PIN 9


U24A 74LS74
SPARE

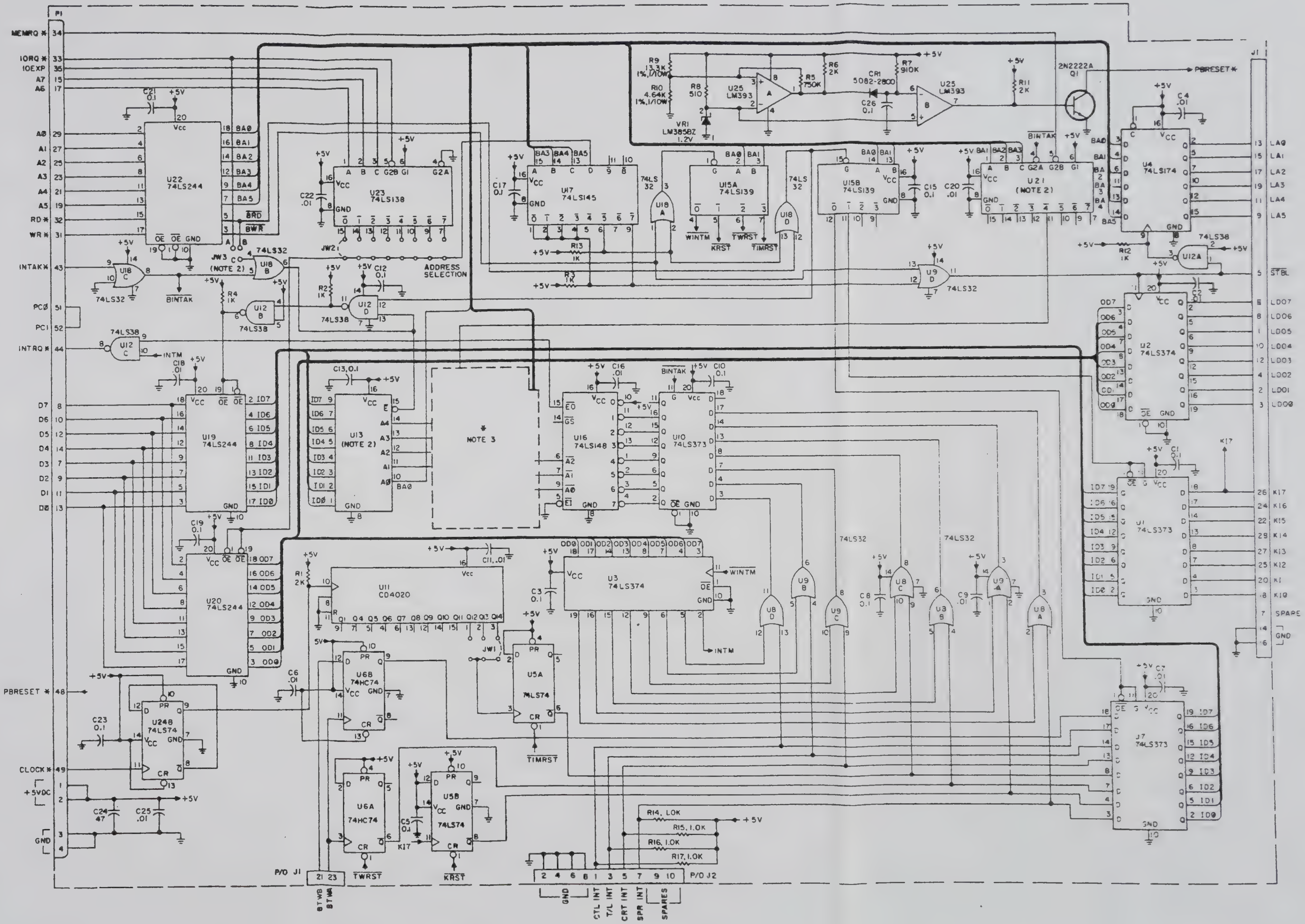
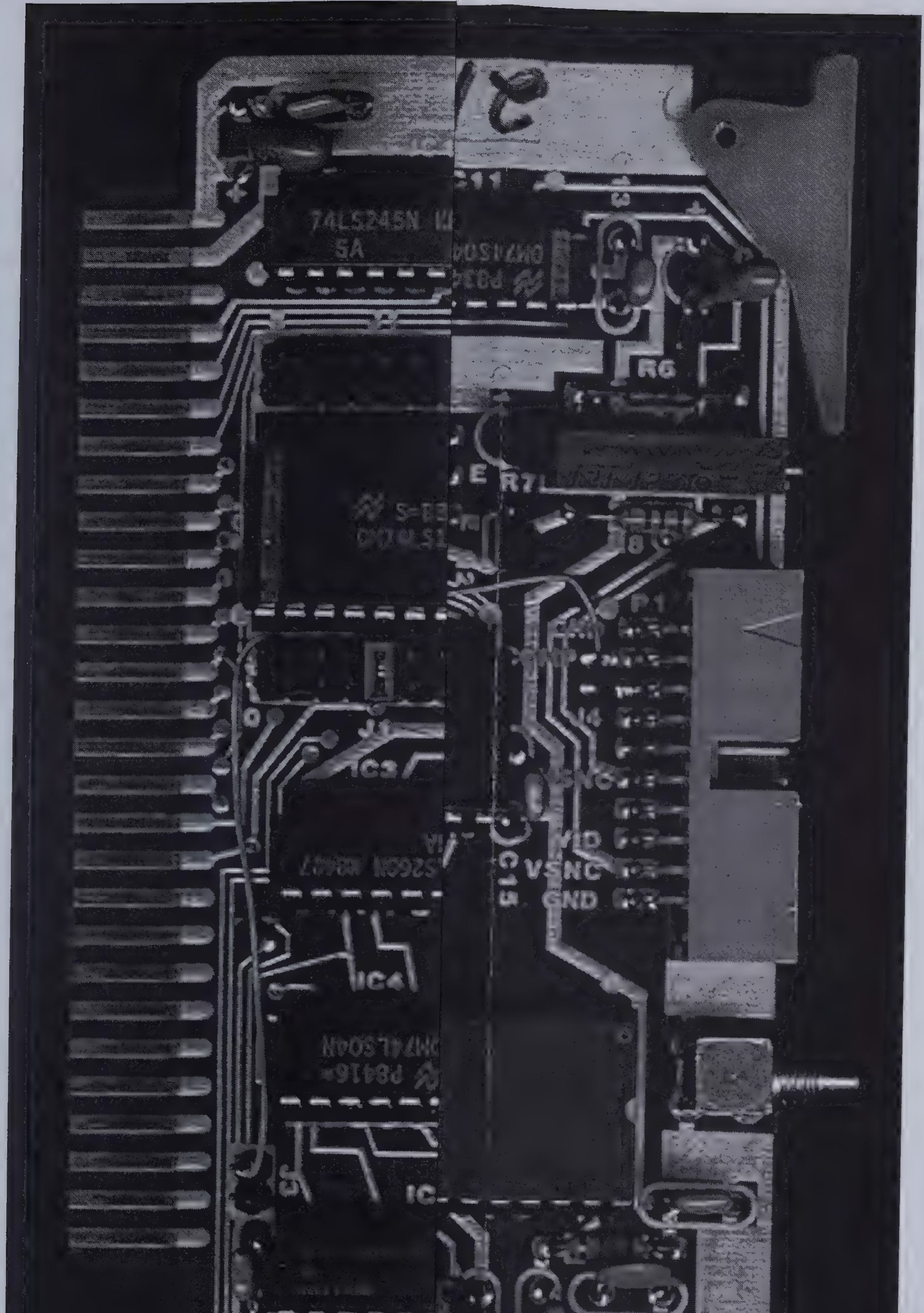
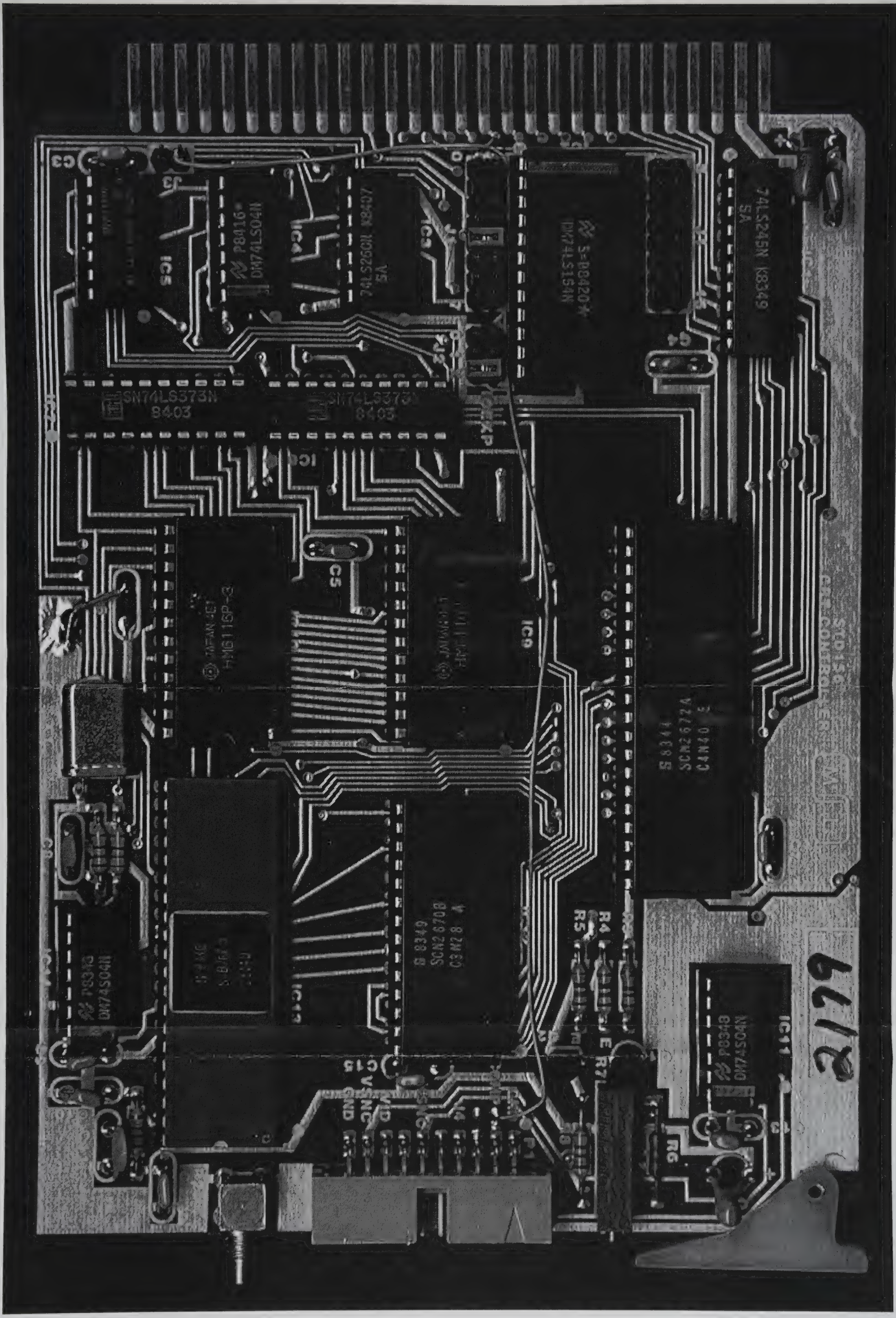

P1
MEMRQ*
IORQ*
IOEXP
INTAK*
PC0
PC1
INTRQ*
PBRESET*
CLOCK*
+5VDC
GND
U22 74LS244
U23 74LS138
U17 74LS145
U15A 74LS139
U15B 74LS139
U21 (NOTE 2)
U4 74LS174
U25 LM393
2N2222A Q1
PBRESET*
U19 74LS244
U13 (NOTE 2)
NOTE 3
U16 74LS148
U10 74LS373
U2 74LS374
U1 74LS373
U20 74LS244
U11 CD4020
U3 74LS374
U7 74LS373
U6B 74HC74
U5A 74LS74
U24B 74LS74
U6A 74HC74
U5B 74LS74
ADDRESS SELECTION
WINTM
KRST
TWRST
TIMRST
INTM
BINTAK
J1
STBL
SPARE
P/O J1
P/O J2
CTL INT
T/L INT
CRT INT
SPR INT
SPARES

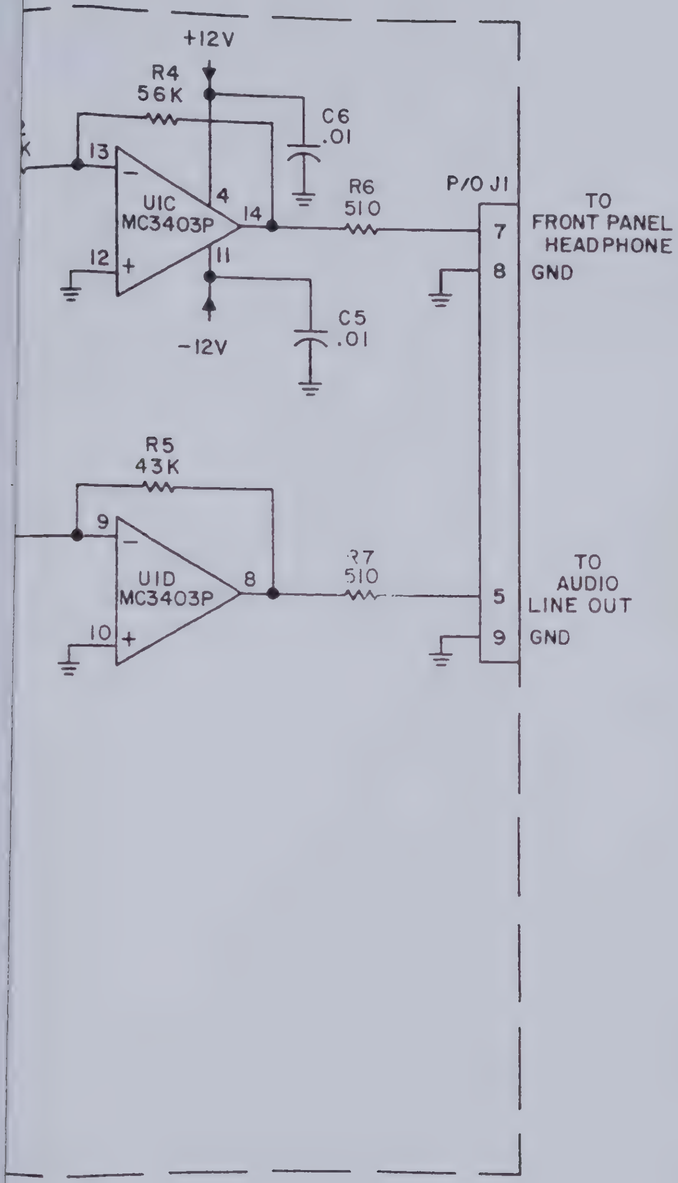
Figure 4-4. Type 796365-1, Standard Bus Front Panel Control (A4A2), Schematic Diagram 580268 (D)


74LS245N
SA
DM74S04N
R6
R7
P1
IC3
C15
VID
VSNC
GND
IC4
DM74LS04N
P8416
C3

CRT CTL A4A5


STD150
CRT CONTROLLER
2179
74LS245N K8349
5A
S-B8420
DM74LS154N
74LS260N K8407
5A
P8416
DM74LS04N
SN74LS373N
8403
HM6116P-3
S8344
SCN2672A
C4N40
B 8349
SCN2670B
C3N28
P8348
DM74S04N
IC3
IC4
IC5
IC9
IC11
IC13
C3
C4
C5
C8
C15
R4
R5
R6
R7
J2
J3
P1
EXP
VID
VSNC
HSNC
GND

CRT CTL A4A5


+12V
R4
56K
C6
.01
13
UIC
MC3403P
4
14
R6
510
P/O J1
7
8
TO
FRONT PANEL
HEADPHONE
GND
12
11
-12V
C5
.01
R5
43K
9
UID
MC3403P
8
R7
510
5
9
TO
AUDIO
LINE OUT
GND
10

re 4-5. Type 796463-1, Audio Amplifier (A4A10), Schematic Diagram 380785 (A)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN µF.
   b) RESISTANCE IS IN OHMS, ±5%, 1/4 W.

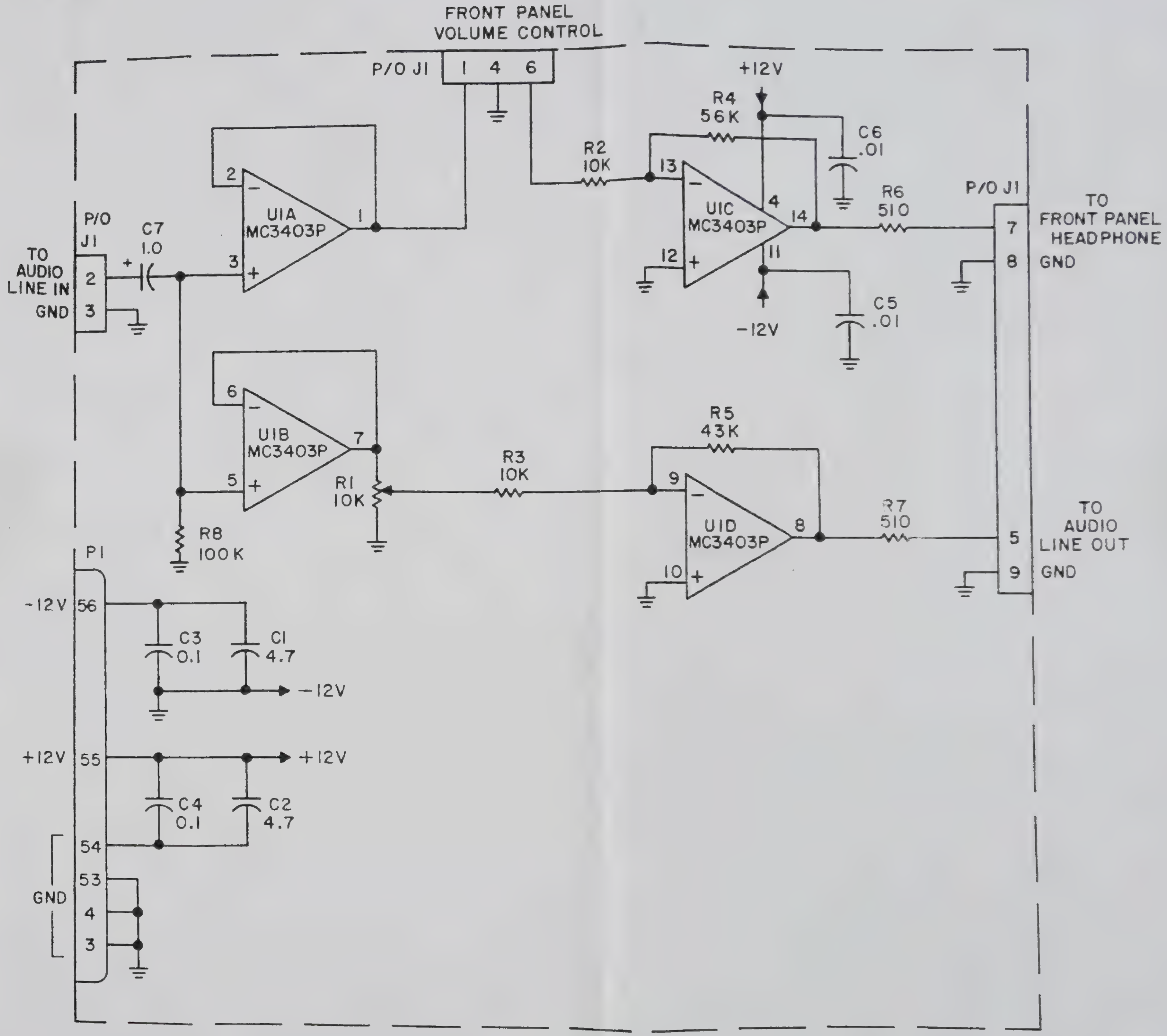
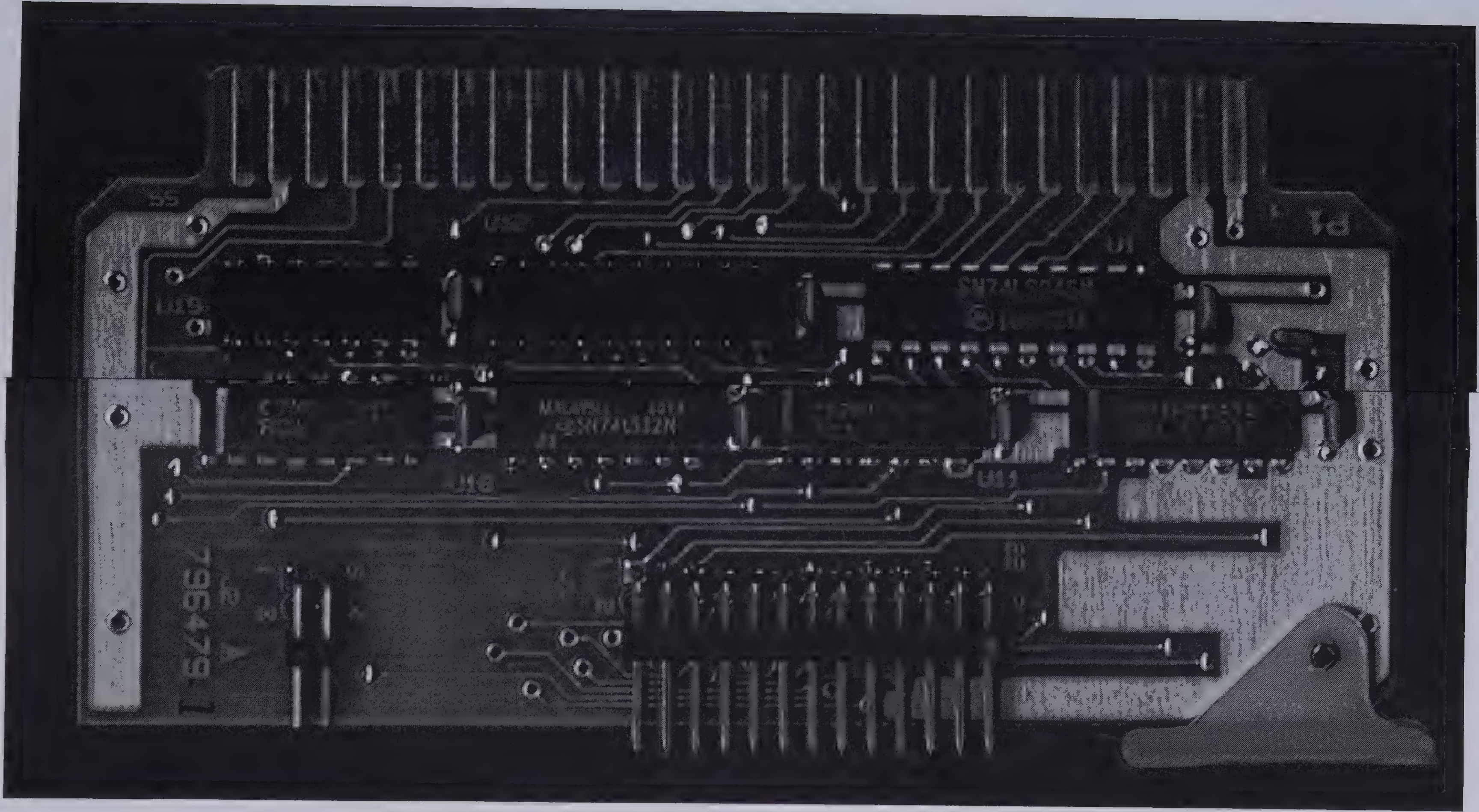
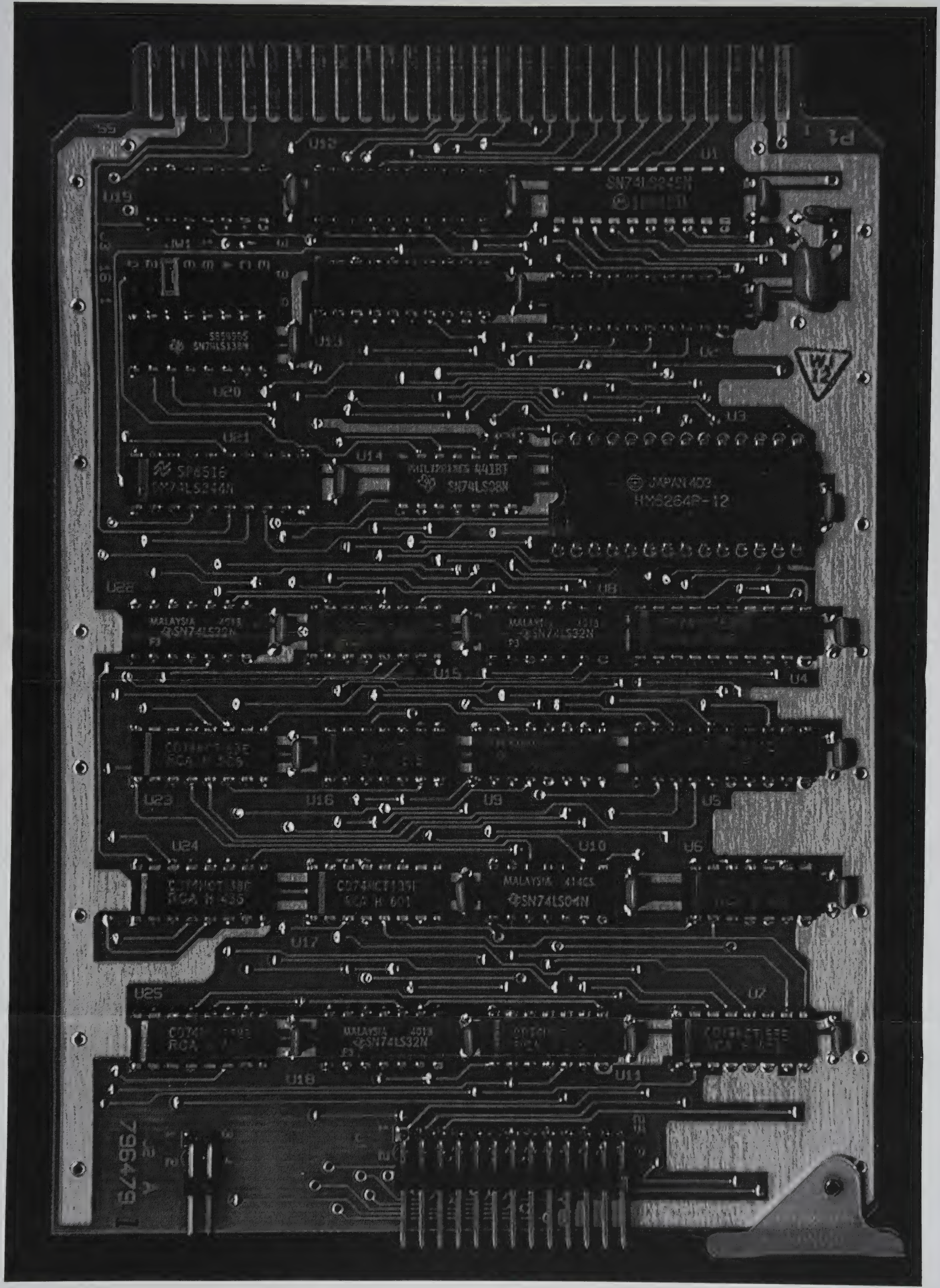

FRONT PANEL VOLUME CONTROL
P/O J1
1 4 6
+12V
R4 56K
C6 .01
R2 10K
13
U1C MC3403P
4
14
12
11
-12V
C5 .01
R6 510
P/O J1
7
8
TO FRONT PANEL HEADPHONE
GND
P/O J1
TO AUDIO LINE IN
2
3
GND
C7 1.0
U1A MC3403P
1
U1B MC3403P
6
5
7
R1 10K
R3 10K
R5 43K
9
U1D MC3403P
8
10
R7 510
5
9
TO AUDIO LINE OUT
GND
R8 100K
P1
-12V 56
C3 0.1
C1 4.7
-12V
+12V 55
+12V
C4 0.1
C2 4.7
54
53
4
3
GND

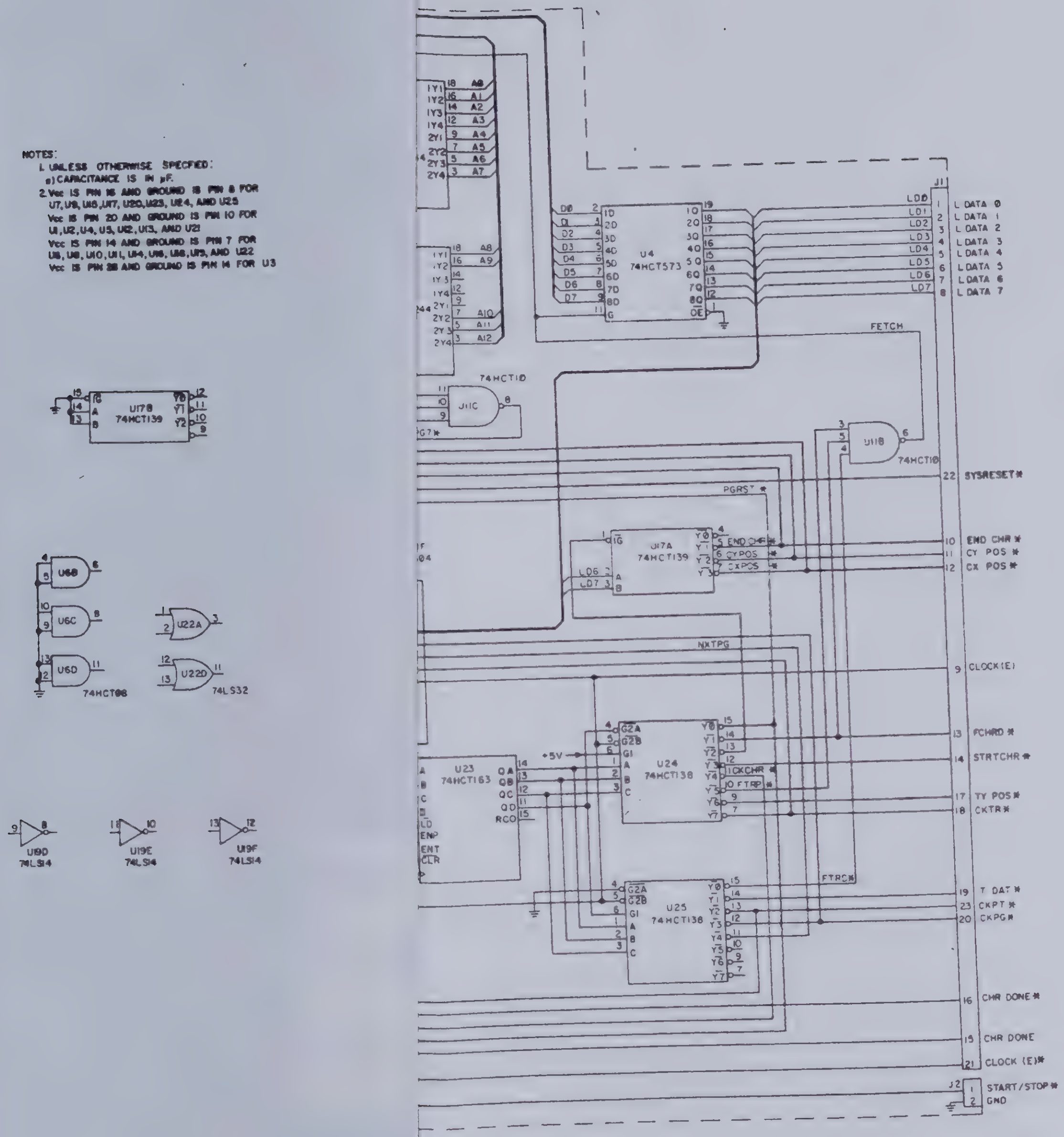
Figure 4-5. Type 796463-1, Audio Amplifier (A4A10), Schematic Diagram 380785 (A)


P1
55
U11
U18
U19
796479 1

DRD CTL
44A13

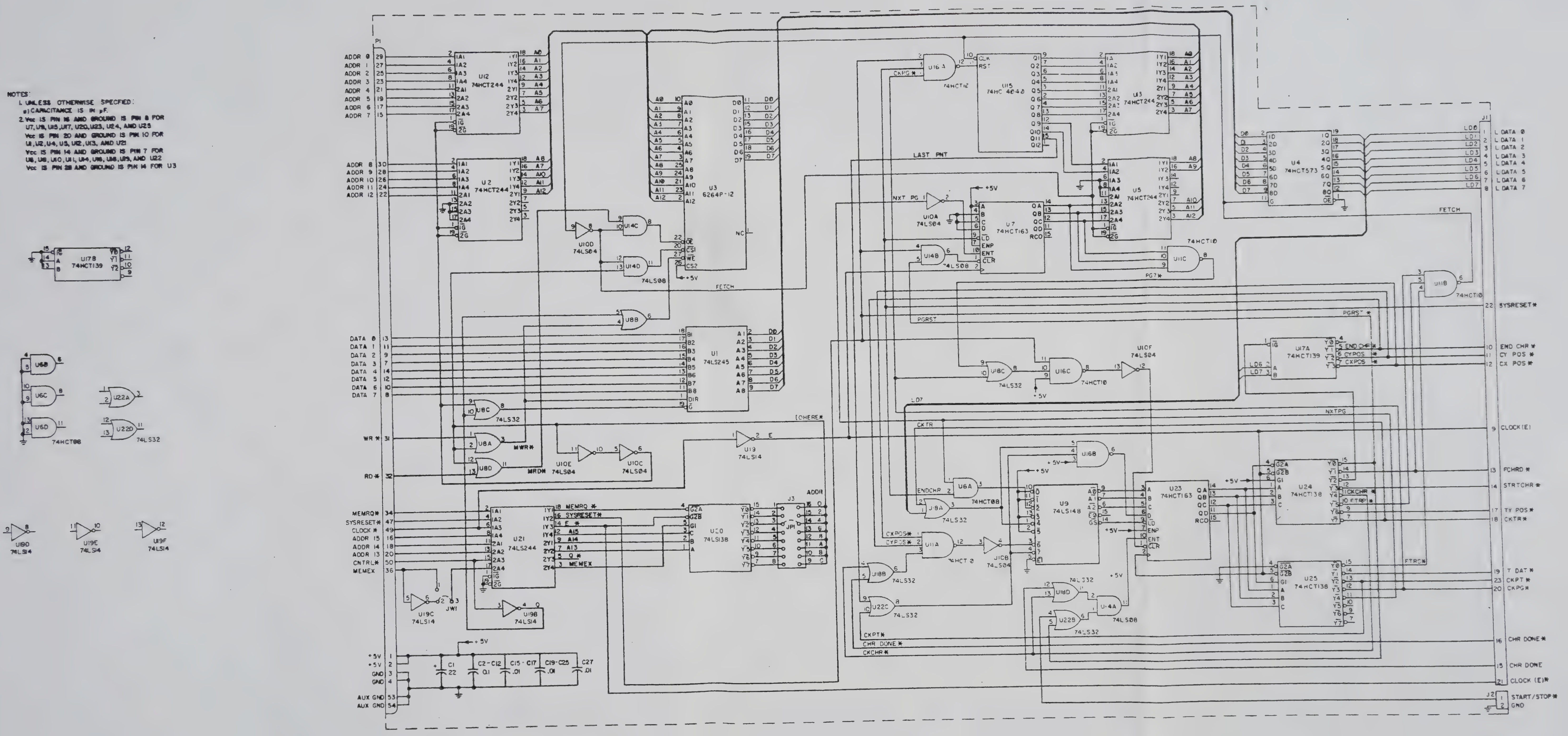

P1
55
U1
SN74LS245N
U12
U19
JW1
J3
16
U2
U13
SN74LS138N
U20
W1 12
U3
JAPAN 402
HM6264P-12
U21
SP6516
SN74LS244N
U14
SN74LS08N
U8
U22
MALAYSIA
SN74LS32N
U15
U4
U23
U16
U9
U5
CD74HCT138E
RCA H 435
U24
CD74HCT139E
RCA H 601
MALAYSIA 414CS
SN74LS04N
U10
U6
U17
U25
U7
U18
U11
796479 A
J2

DRD CTL
A4A13


U4
74HCT573
D0
D1
D2
D3
D4
D5
D6
D7
LD0
LD1
LD2
LD3
LD4
LD5
LD6
LD7
OE
G
J1
L DATA 0
L DATA 1
L DATA 2
L DATA 3
L DATA 4
L DATA 5
L DATA 6
L DATA 7
FETCH
74HCT10
U11C
U11B
22 SYSRESET*
PGRST*
U17A
74HCT139
END CHR*
CY POS*
CX POS*
10 END CHR*
11 CY POS*
12 CX POS*
LD6
LD7
NXTPG
9 CLOCK(E)
U24
74HCT138
U23
74HCT163
+5V
CKCHR*
FTRP*
13 FCHRD*
14 STRTCHR*
17 TY POS*
18 CKTR*
FTRC*
U25
74HCT138
19 T DAT*
23 CKPT*
20 CKPG*
16 CHR DONE*
15 CHR DONE
21 CLOCK (E)*
J2
1 START/STOP*
2 GND
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
1Y1
1Y2
1Y3
1Y4
2Y1
2Y2
2Y3
2Y4
U17B
74HCT139
U6B
U6C
U6D
74HCT08
U22A
U22D
74LS32
U19D
74LS14
U19E
74LS14
U19F
74LS14

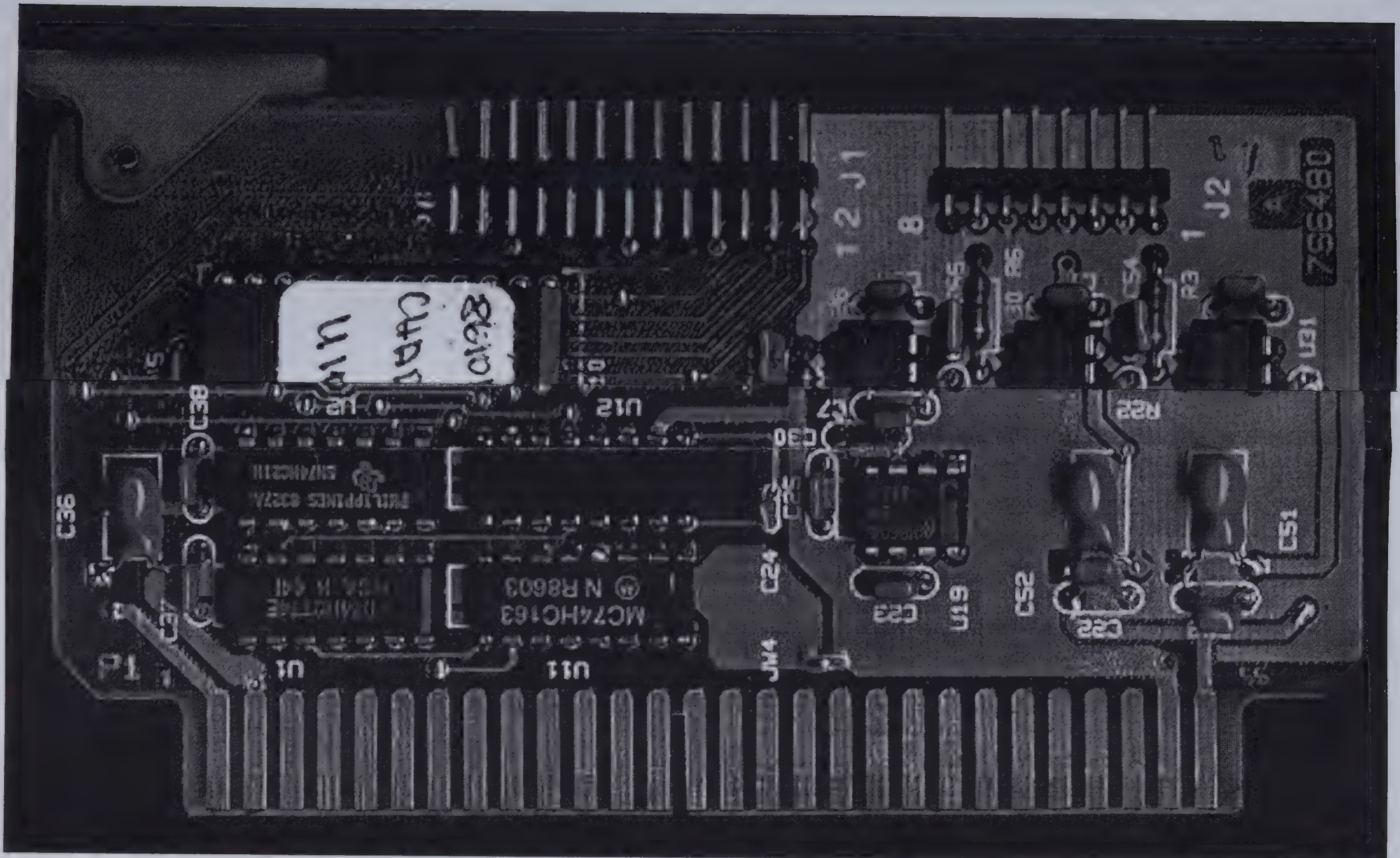
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN pF.
2. Vcc IS PIN 16 AND GROUND IS PIN 8 FOR U7, U9, U16, U17, U20, U23, U24, AND U25
Vcc IS PIN 20 AND GROUND IS PIN 10 FOR U1, U2, U4, U5, U12, U13, AND U21
Vcc IS PIN 14 AND GROUND IS PIN 7 FOR U6, U8, U10, U11, U14, U16, U18, U19, AND U22
Vcc IS PIN 28 AND GROUND IS PIN 14 FOR U3

igure 4-6. Type 796479-1, DRD Control (A4A13), Schematic Diagram 580471 (A)

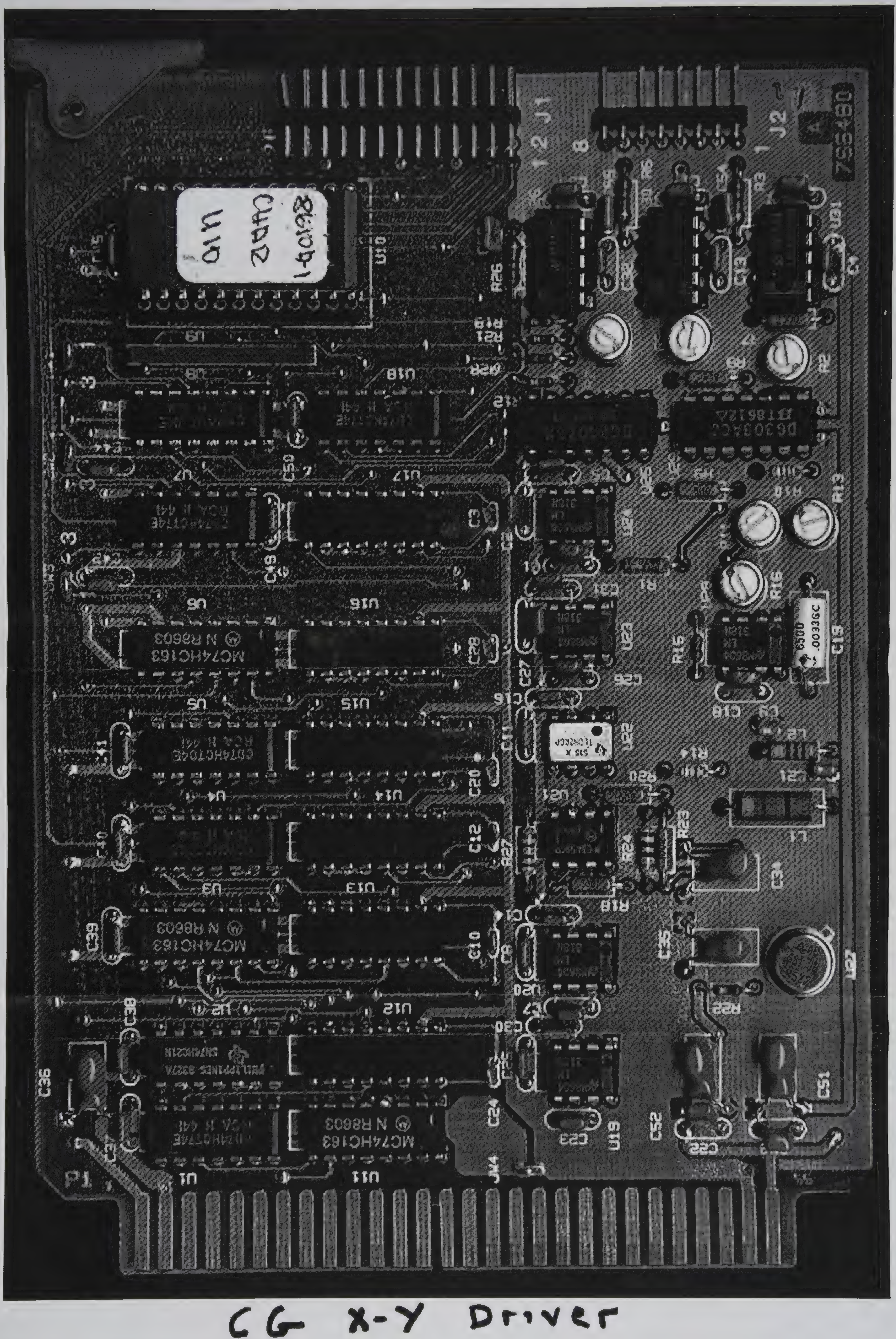

P1
ADDR 0
ADDR 1
ADDR 2
ADDR 3
ADDR 4
ADDR 5
ADDR 6
ADDR 7
ADDR 8
ADDR 9
ADDR 10
ADDR 11
ADDR 12
U12 74HCT244
U2 74HCT244
U3 6264P-12
FETCH
U10D 74LS04
U14C
U14D 74LS08
U8B
DATA 0
DATA 1
DATA 2
DATA 3
DATA 4
DATA 5
DATA 6
DATA 7
U1 74LS245
U8C 74LS32
U8A
U8D
MWR*
MRD*
WR*
RD*
U10E 74LS04
U10C 74LS04
U13 74LS14
IOHERE*
MEMRQ*
SYSRESET*
CLOCK*
ADDR 15
ADDR 14
ADDR 13
CNTRL*
MEMEX
U21 74LS244
U20 74LS138
J3
ADDR
JP1
U19C 74LS14
JW1
U19B 74LS14
+5V
GND
AUX GND
C1 22
C2-C12 .01
C15-C17 .01
C19-C25 .01
C27 .01
U16A 74HCT32
CKPG*
U15 74HC4040
U13 74HCT244
U5 74HCT244
LAST PNT
NXT PG
U10A 74LS04
U7 74HCT163
U14B 74LS08
U11C 74HCT10
PG7*
U4 74HCT573
J1
L DATA 0
L DATA 1
L DATA 2
L DATA 3
L DATA 4
L DATA 5
L DATA 6
L DATA 7
U11B 74HCT10
SYSRESET*
PGRST*
U17A 74HCT139
END CHR*
CY POS*
CX POS*
U18C 74LS32
U16C 74HCT10
U10F 74LS04
NXTPG
CKTR
CLOCK(E)
U16B
U6A 74HCT08
ENDCHR
U18A 74LS32
U9 74LS148
U23 74HCT163
U24 74HCT138
FCHRD*
STRTCHR*
TY POS*
CKTR*
CXPOS*
CYPOS*
U11A 74HCT10
U10B 74LS04
U18B 74LS32
U22C 74LS32
U18D 74LS32
U22B 74LS32
U14A 74LS08
U25 74HCT138
FTRC*
T DAT*
CKPT*
CKPG*
CKPT*
CHR DONE*
CKCHR*
CHR DONE
CLOCK (E)*
J2
START/STOP*
U17B 74HCT139
U6B
U6C
U6D 74HCT08
U22A
U22D 74LS32
U19D 74LS14
U19E 74LS14
U19F 74LS14

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN μF.
2. Vcc IS PIN 16 AND GROUND IS PIN 8 FOR U7, U9, U15, U17, U20, U23, U24, AND U25
Vcc IS PIN 20 AND GROUND IS PIN 10 FOR U1, U2, U4, U5, U12, U13, AND U21
Vcc IS PIN 14 AND GROUND IS PIN 7 FOR U6, U8, U10, U11, U14, U16, U18, U19, AND U22
Vcc IS PIN 28 AND GROUND IS PIN 14 FOR U3

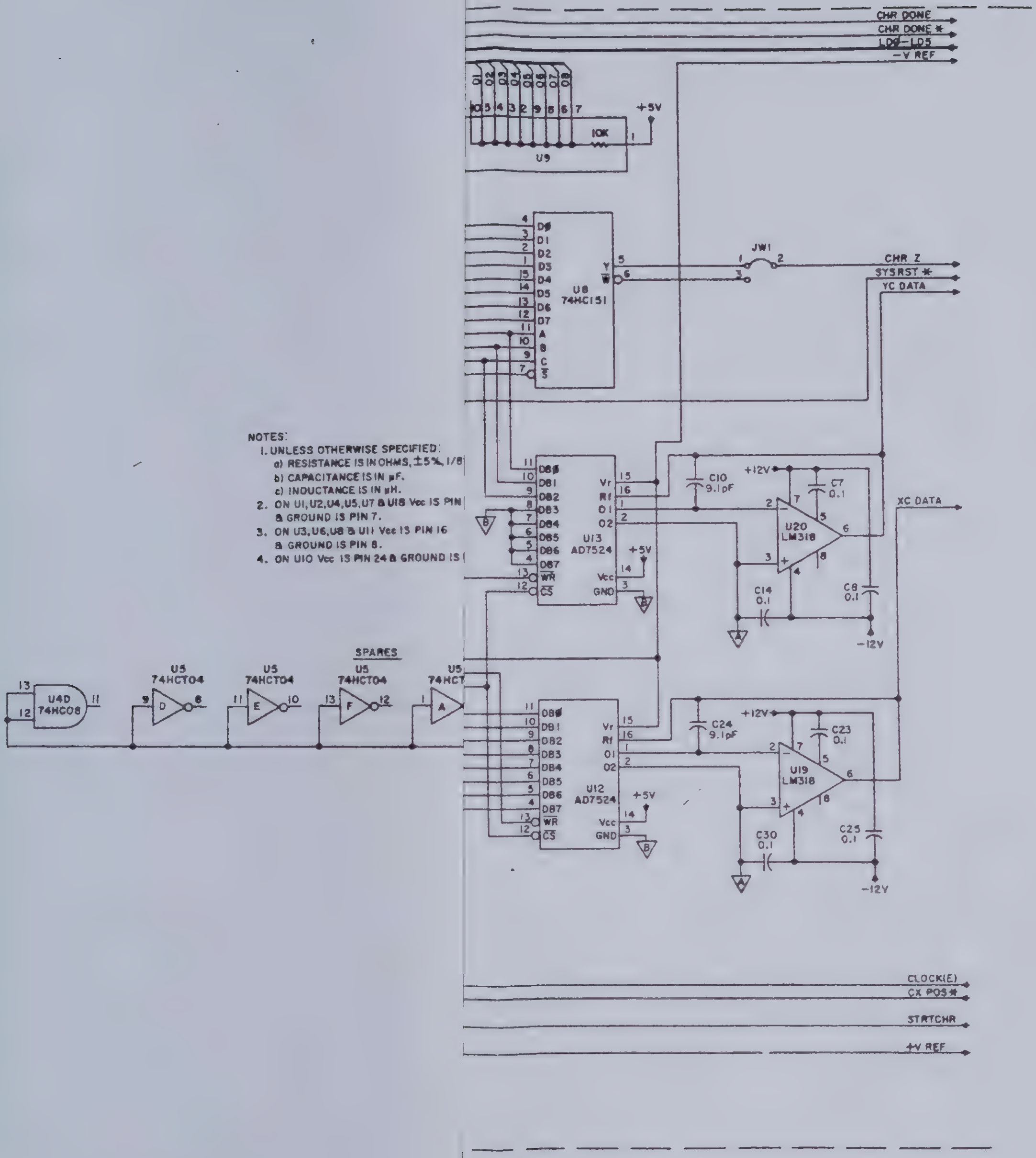
Figure 4-6. **Type 796479-1, DRD Control (A4A13), Schematic Diagram 580471 (A)**


7S6480
J2
J1
U31
R3
R22
C51
C52
C22
U19
C23
C24
JW4
C30
U12
U2
MC74HC163
N R8603
PHILIPPINES
U11
U1
C38
C36
P1

CG X-Y Driver


756480
J2
J1
861041
CHAR
U10
DG303ACJ
MC74HC163
CD74HC704E
SN74HC21N
P1
JM4

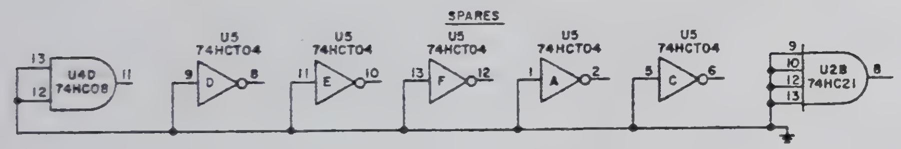
CG X-Y Driver


CHR DONE
CHR DONE *
LD0-LD5
-V REF
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
+5V
10K
U9
D0
D1
D2
D3
D4
D5
D6
D7
A
B
C
S
Y
W
U8
74HC151
JW1
CHR Z
SYSRST *
YC DATA
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
WR
CS
Vr
Rf
O1
O2
Vcc
GND
U13
AD7524
C10
9.1pF
+12V
C7
0.1
U20
LM318
XC DATA
C14
0.1
C8
0.1
-12V
SPARES
U4D
74HC08
U5
74HCT04
D
E
F
A
U12
AD7524
C24
9.1pF
C23
0.1
U19
LM318
C30
0.1
C25
0.1
CLOCK(E)
CX POS *
STRTCHR
+V REF

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) RESISTANCE IS IN OHMS, ±5%, 1/8
b) CAPACITANCE IS IN µF.
c) INDUCTANCE IS IN µH.
2. ON U1, U2, U4, U5, U7 & U18 Vcc IS PIN
& GROUND IS PIN 7.
3. ON U3, U6, U8 & U11 Vcc IS PIN 16
& GROUND IS PIN 8.
4. ON U10 Vcc IS PIN 24 & GROUND IS

)-1, Character Generation/XY Driver (A4A14),
Diagram 580473 (Sheet 1 of 2) (B)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN µF.
   c) INDUCTANCE IS IN µH.
2. ON U1, U2, U4, U5, U7 & U18 Vcc IS PIN 14 & GROUND IS PIN 7.
3. ON U3, U6, U8 & U11 Vcc IS PIN 16 & GROUND IS PIN 8.
4. ON U10 Vcc IS PIN 24 & GROUND IS PIN 12.


SPARES
U4D
74HC08
U5
74HCT04
U2B
74HC21

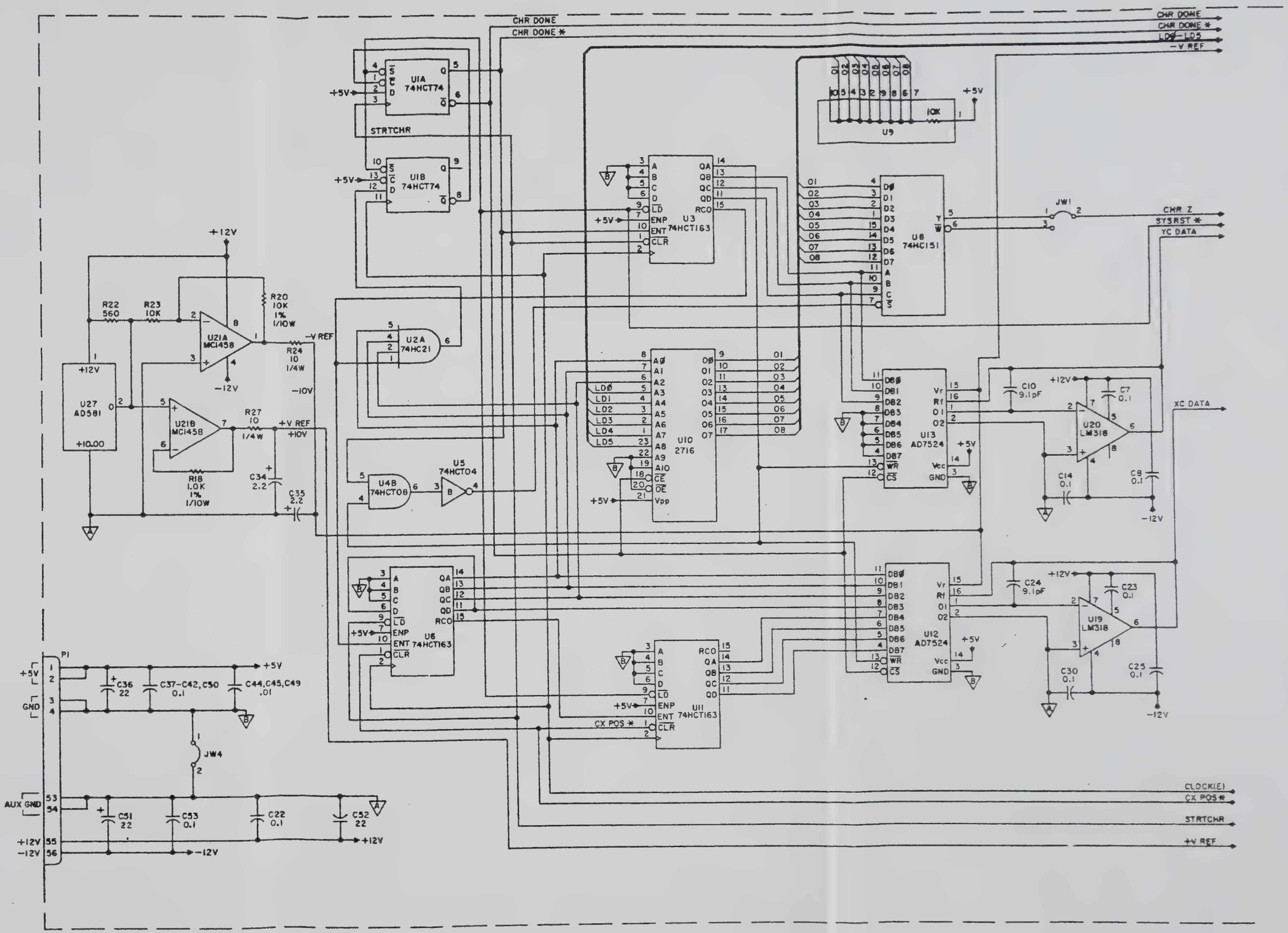
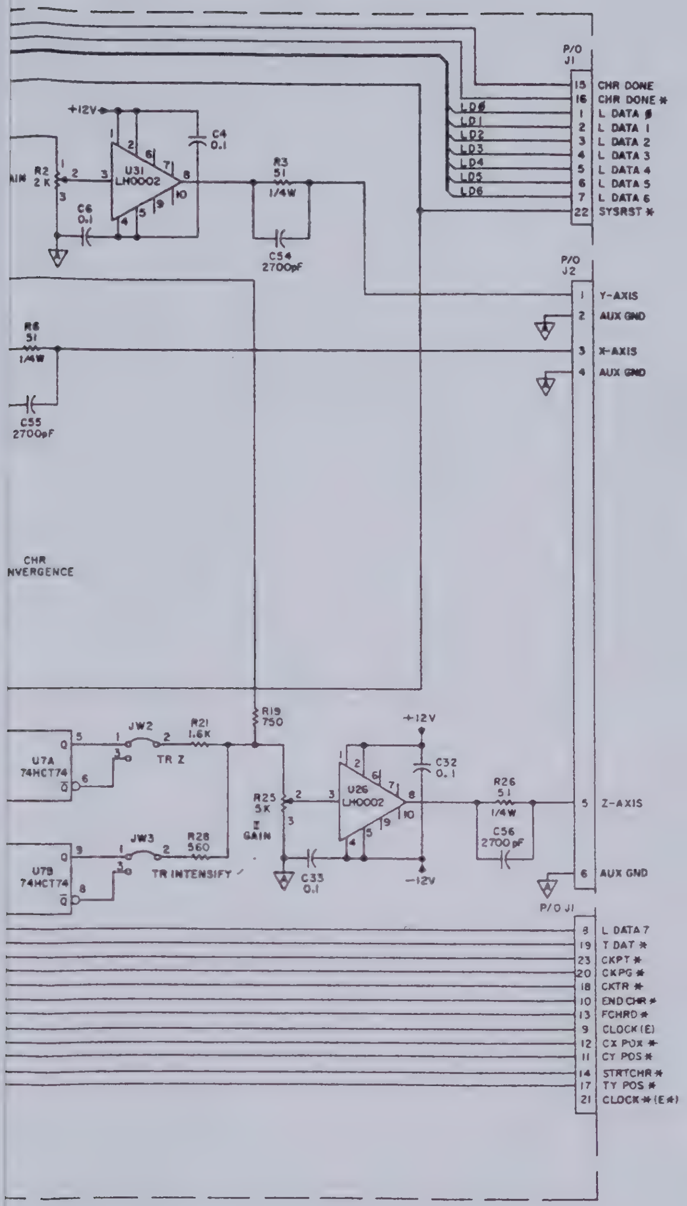

CHR DONE
CHR DONE *
LD0-LD5
-V REF
U1A
74HCT74
U1B
74HCT74
STRTCHR
+5V
+12V
R22
560
R23
10K
R20
10K
1%
1/10W
U21A
MC1458
U21B
MC1458
R24
10
1/4W
-V REF
-10V
U27
AD581
+10.00
R27
10
1/4W
+V REF
+10V
R18
1.0K
1%
1/10W
C34
2.2
C35
2.2
-12V
U2A
74HC21
U4B
74HCT08
U5
74HCT04
U3
74HCT163
U10
2716
U9
10K
U8
74HC151
JW1
CHR Z
SYSRST *
YC DATA
XC DATA
U13
AD7524
C10
9.1pF
U20
LM318
C7
0.1
C14
0.1
C8
0.1
U6
74HCT163
U11
74HCT163
CX POS *
U12
AD7524
C24
9.1pF
U19
LM318
C23
0.1
C30
0.1
C25
0.1
P1
+5V
GND
AUX GND
+12V
-12V
C36
22
C37-C42, C50
0.1
C44, C45, C49
.01
JW4
C51
22
C53
0.1
C22
0.1
C52
22
CLOCK(E)
CX POS *
STRTCHR
+V REF

Figure 4-7. Type 796480-1, Character Generation/XY Driver (A4A14), Schematic Diagram 580473 (Sheet 1 of 2) (B)


P/O J1
15 CHR DONE
16 CHR DONE *
1 L DATA Ø
2 L DATA 1
3 L DATA 2
4 L DATA 3
5 L DATA 4
6 L DATA 5
7 L DATA 6
22 SYSRST *
LDØ
LD1
LD2
LD3
LD4
LD5
LD6
+12V
C4 0.1
U31 LH0002
R2 2K
AIN
C6 0.1
R3 51 1/4W
C54 2700pF
P/O J2
1 Y-AXIS
2 AUX GND
3 X-AXIS
4 AUX GND
5 Z-AXIS
6 AUX GND
R6 51 1/4W
C55 2700pF
CHR
NVERGENCE
U7A 74HCT74
JW2
TR Z
R21 1.6K
R19 750
U7B 74HCT74
JW3
TR INTENSIFY
R28 560
R25 5K
Z GAIN
C33 0.1
+12V
C32 0.1
U26 LH0002
-12V
R26 51 1/4W
C56 2700pF
P/O J1
8 L DATA 7
19 T DAT *
23 CKPT *
20 CKPG *
18 CKTR *
10 END CHR *
13 FCHRD *
9 CLOCK (E)
12 CX POX *
11 CY POS *
14 STRTCHR *
17 TY POS *
21 CLOCK * (E*)

796480-1, Character Generation/XY Driver (A4A14),
atic Diagram 580473 (Sheet 2 of 2) (B)

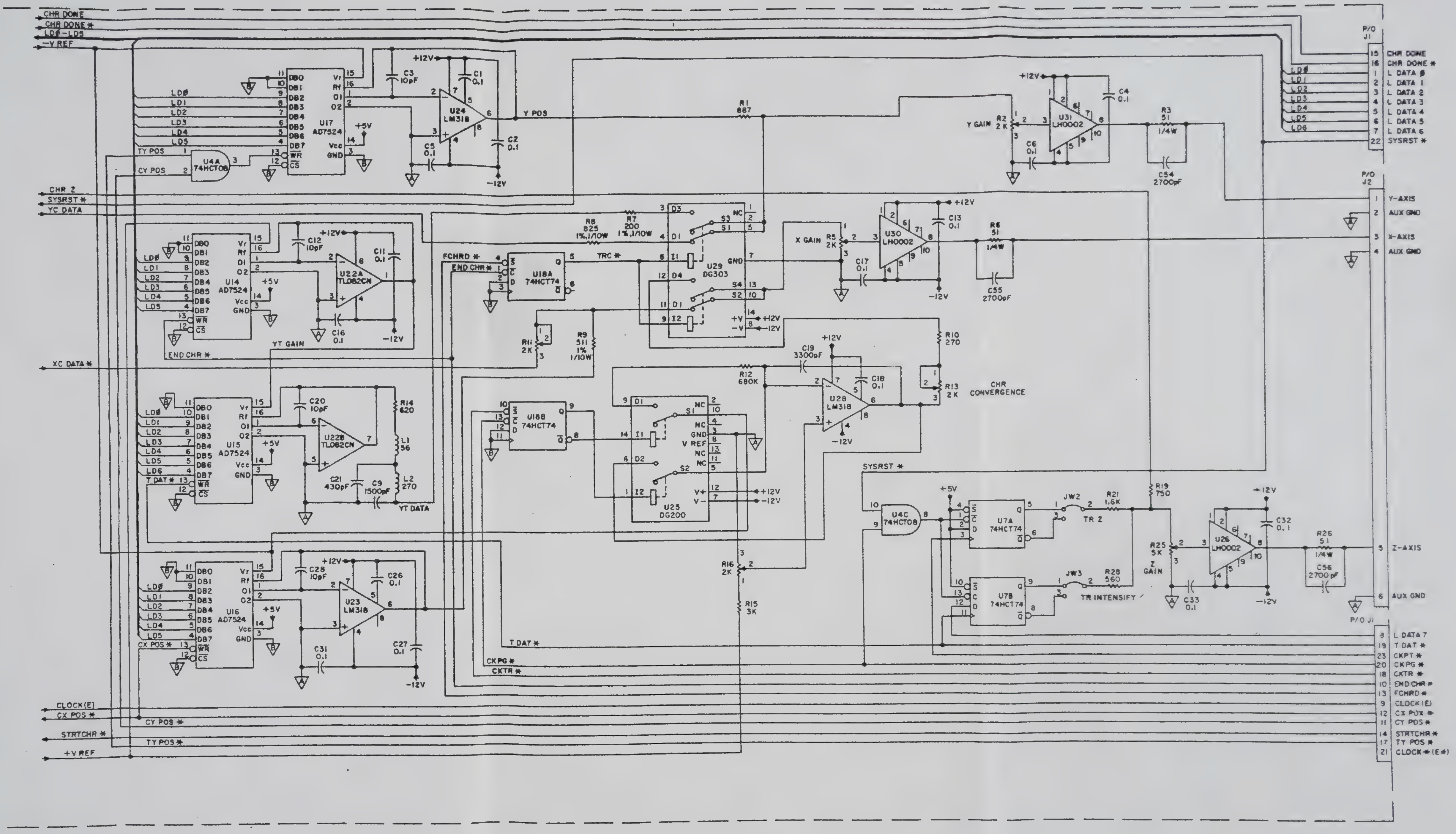
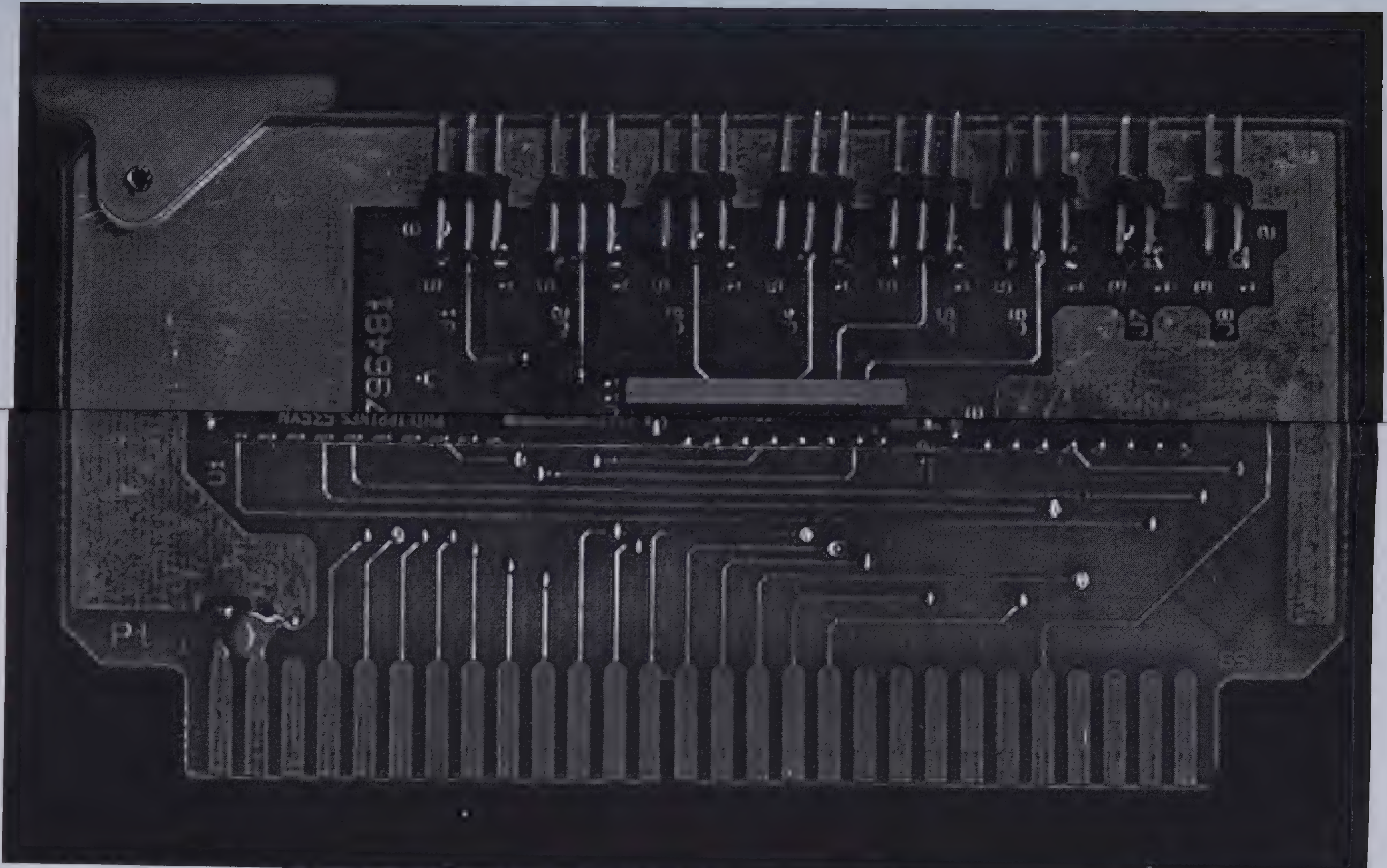
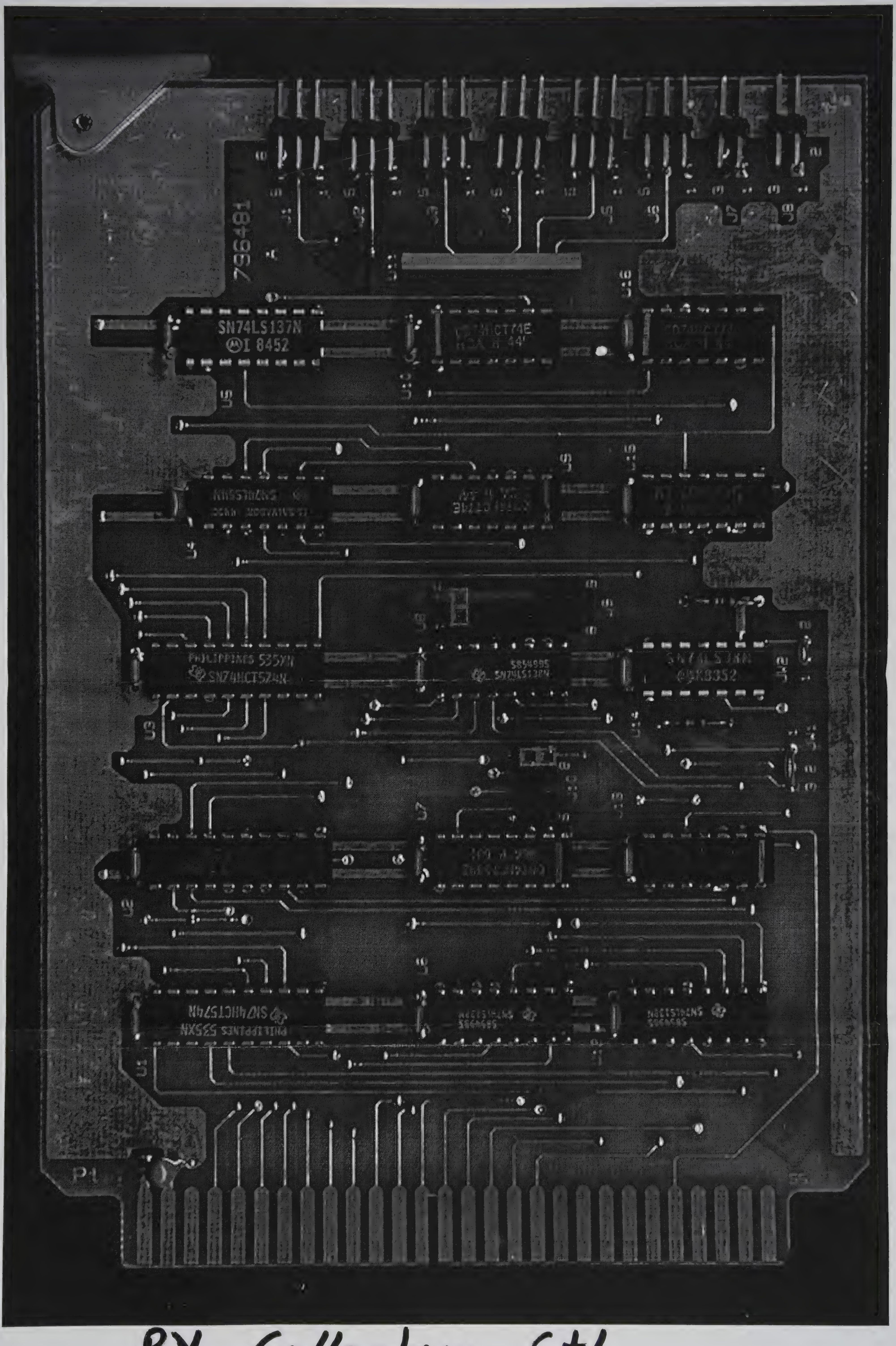

CHR DONE
CHR DONE *
LDØ-LD5
-Y REF
U17 AD7524
U24 LM318
Y POS
U4A 74HCT08
TY POS
CY POS
CHR Z
SYSRST *
YC DATA
U14 AD7524
U22A TL082CN
YT GAIN
END CHR *
XC DATA *
U15 AD7524
U22B TL082CN
YT DATA
U16 AD7524
U23 LM318
CX POS *
FCHRD *
END CHR *
U18A 74HCT74
TRC *
U29 DG303
R11 2K
R9 511 1% 1/10W
R8 825 1% 1/10W
R7 200 1% 1/10W
R1 887
U18B 74HCT74
U25 DG200
V REF
R16 2K
R15 3K
U28 LM318
R12 680K
C19 3300pF
R10 270
R13 2K
CHR CONVERGENCE
X GAIN R5 2K
U30 LH0002
R6 51 1/4W
C55 2700pF
Y GAIN R2 2K
U31 LH0002
R3 51 1/4W
C54 2700pF
SYSRST *
U4C 74HCT08
U7A 74HCT74
U7B 74HCT74
JW2
TR Z
JW3
TR INTENSIFY
R21 1.6K
R28 560
R19 750
R25 5K Z GAIN
U26 LH0002
R26 51 1/4W
C56 2700 pF
T DAT *
CKPG *
CKTR *
CLOCK(E)
CX POS *
CY POS *
STRTCHR *
TY POS *
+V REF
P/O J1
15 CHR DONE
16 CHR DONE *
1 L DATA Ø
2 L DATA 1
3 L DATA 2
4 L DATA 3
5 L DATA 4
6 L DATA 5
7 L DATA 6
22 SYSRST *
P/O J2
1 Y-AXIS
2 AUX GND
3 X-AXIS
4 AUX GND
5 Z-AXIS
6 AUX GND
P/O J1
8 L DATA 7
19 T DAT *
23 CKPT *
20 CKPG *
18 CKTR *
10 END CHR *
13 FCHRD *
9 CLOCK(E)
12 CX POS *
11 CY POS *
14 STRTCHR *
17 TY POS *
21 CLOCK *(E*)

Figure 4-7. Type 796480-1, Character Generation/XY Driver (A4A14), Schematic Diagram 580473 (Sheet 2 of 2) (B)

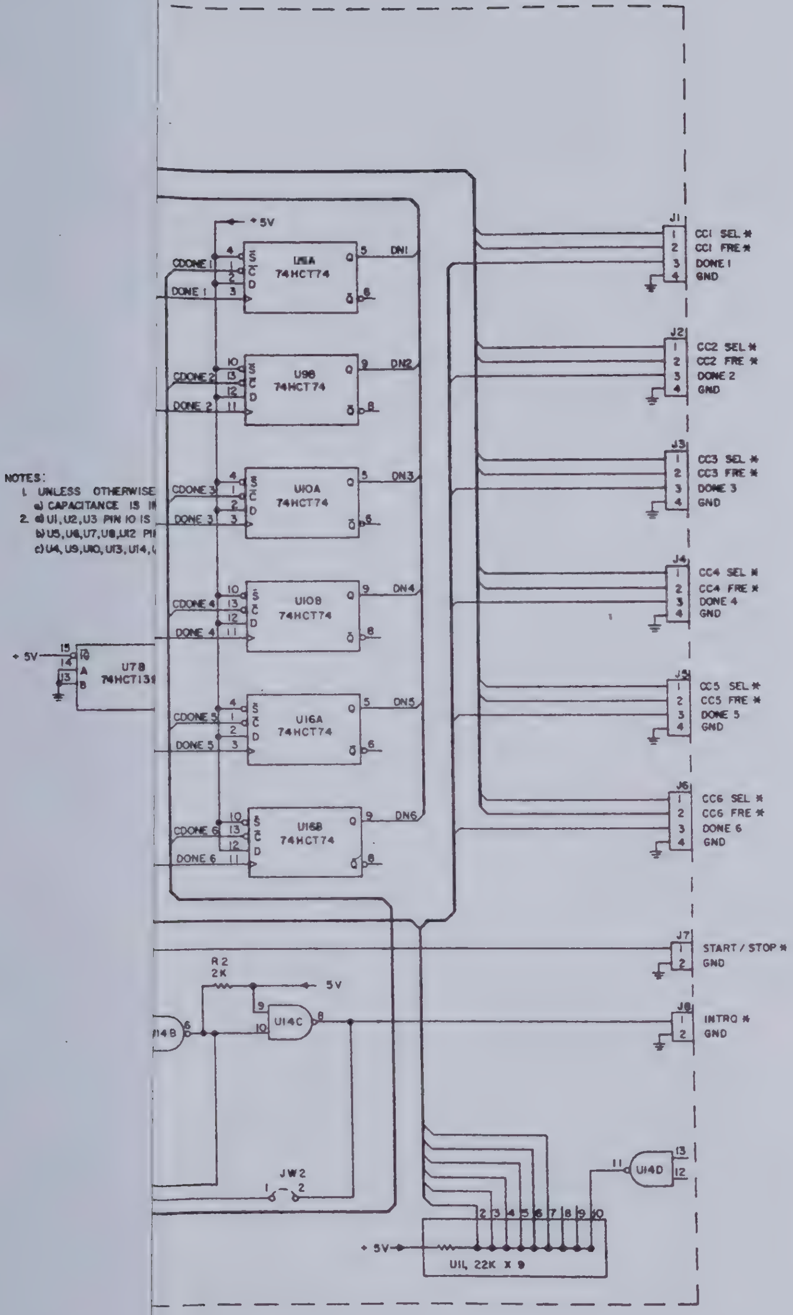

796481
U1
P1
J1
J2
J3
J4
J5
J6
J7
J8

RX Collection Ctl

[illegible]

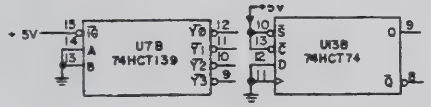

796481
J1
J2
J3
J4
J5
J6
J7
J8
SN74LS137N
I 8452
SN74LS55N
PHILIPPINES 535XN
SN74HCT574N
SN74LS138N
SN74LS13xN
SN74HCT574N
U1
U2
U3
U4
U5
P1

RX Collection Ctl
AUDIT


NOTES:
1. UNLESS OTHERWISE
a) CAPACITANCE IS IN
2. a) U1, U2, U3 PIN 10 IS
b) U5, U6, U7, U8, U12 PI
c) U4, U9, U10, U13, U14,
+5V
U8A
74HCT74
CDONE 1
DONE 1
DN1
U9B
74HCT74
CDONE 2
DONE 2
DN2
U10A
74HCT74
CDONE 3
DONE 3
DN3
U10B
74HCT74
CDONE 4
DONE 4
DN4
U7B
74HCT139
+5V
U16A
74HCT74
CDONE 5
DONE 5
DN5
U16B
74HCT74
CDONE 6
DONE 6
DN6
J1
CC1 SEL *
CC1 FRE *
DONE 1
GND
J2
CC2 SEL *
CC2 FRE *
DONE 2
GND
J3
CC3 SEL *
CC3 FRE *
DONE 3
GND
J4
CC4 SEL *
CC4 FRE *
DONE 4
GND
J5
CC5 SEL *
CC5 FRE *
DONE 5
GND
J6
CC6 SEL *
CC6 FRE *
DONE 6
GND
J7
START / STOP *
GND
J8
INTRO *
GND
R2
2K
5V
U14B
U14C
U14D
JW2
+5V
U11, 22K X 9

pe 796481-1, Receiver Collection Control (A4A15),
hematic Diagram 580445 (A)

NOTES:
1. UNLESS OTHERWISE SPECFIED:
   a) CAPACITANCE IS IN µF.
2. a) U1, U2, U3 PIN 10 IS GND AND PIN 20 IS Vcc.
   b) U5, U6, U7, U8, U12 PIN 8 IS GND AND PIN 16 IS Vcc.
   c) U4, U9, U10, U13, U14, U15, U16 PIN 7 IS GND AND PIN 14 IS Vcc.


+5V
U7B
74HCT139
U13B
74HCT74
+5V

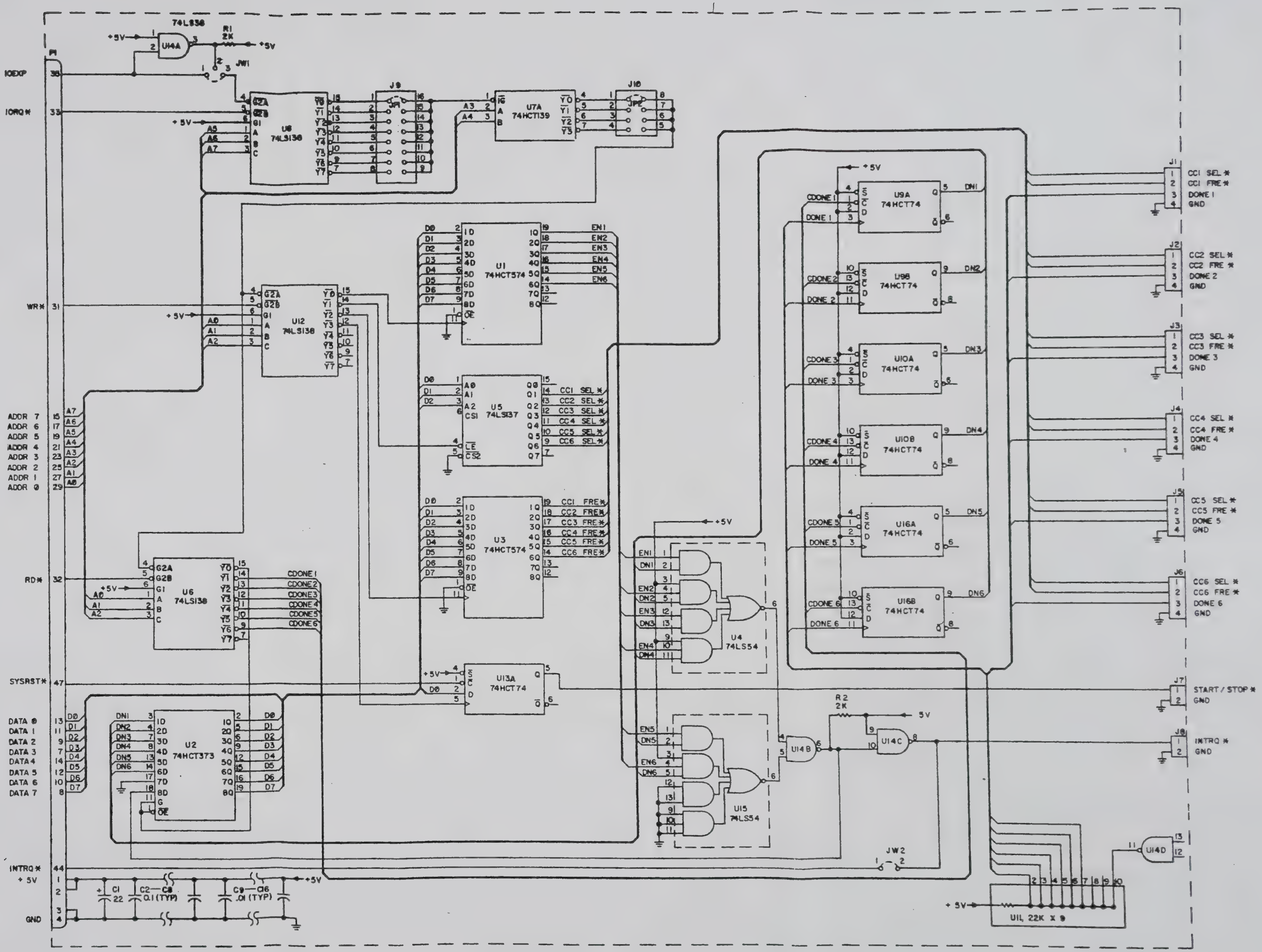
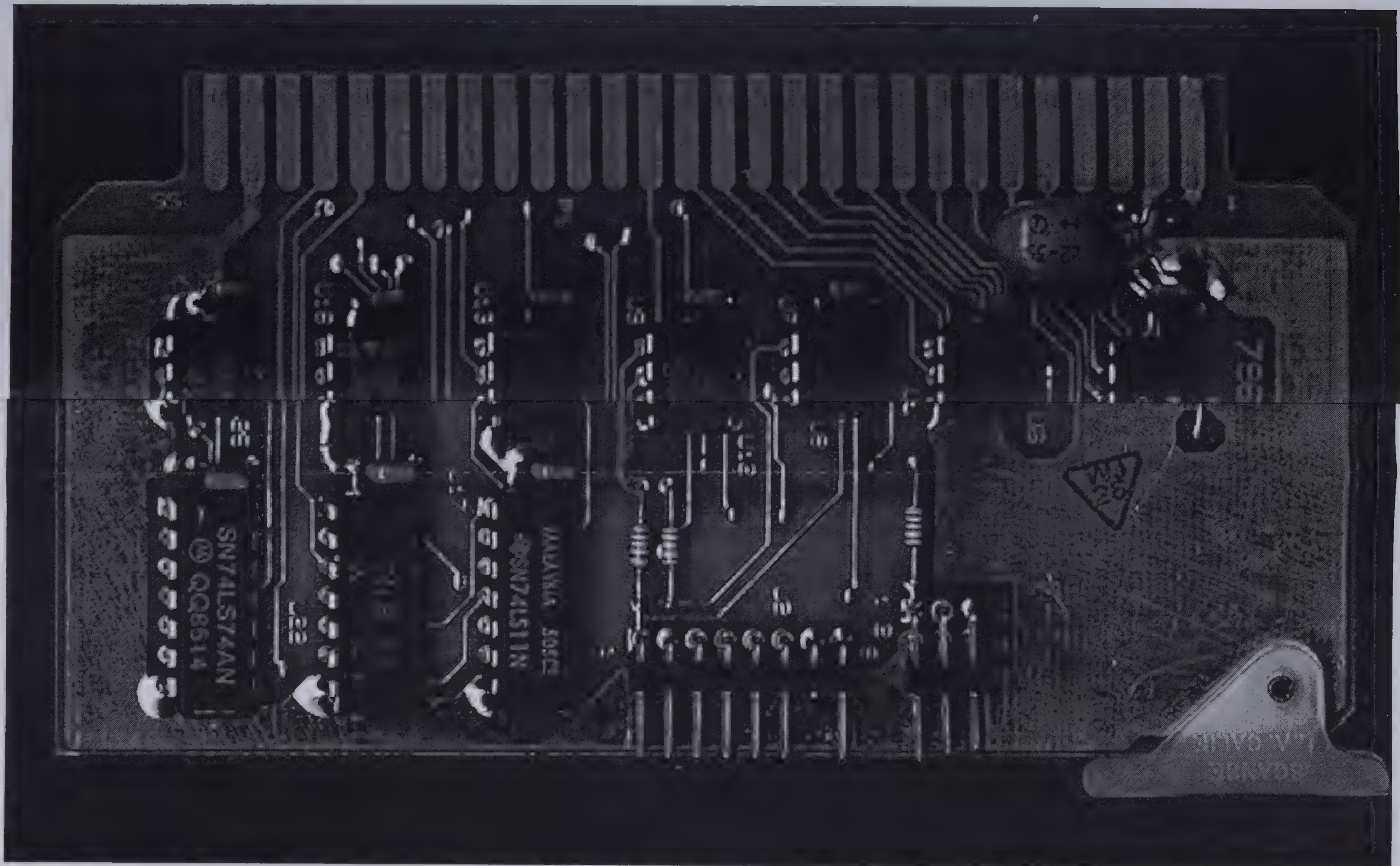
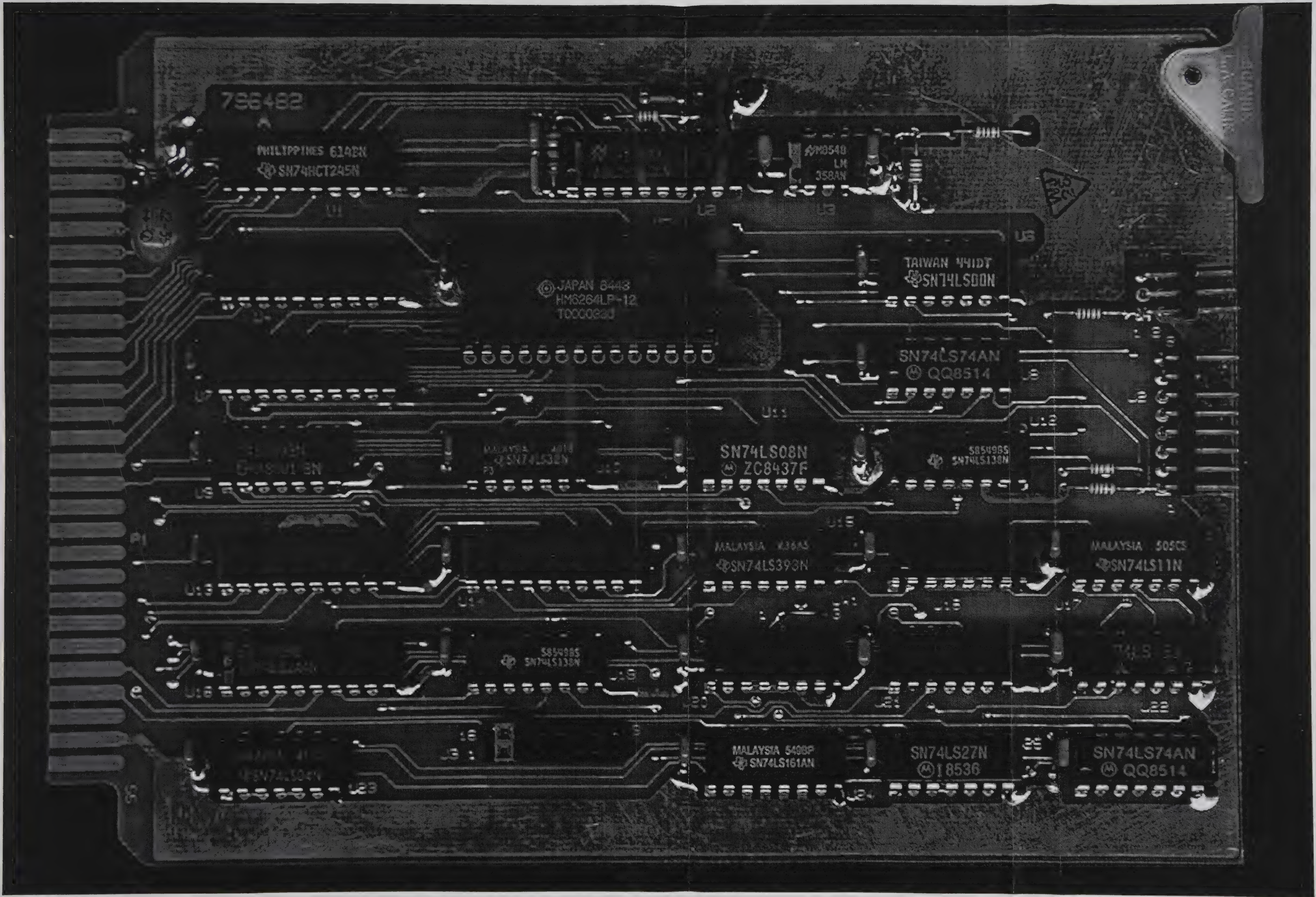

74LS38
U14A
R1 2K
+5V
JW1
P1
IOEXP
IORQ*
U8 74LS138
J9
JP1
U7A 74HCT139
J10
JP2
A3
A4
A5
A6
A7
WR*
U12 74LS138
A0
A1
A2
U1 74HCT574
EN1
EN2
EN3
EN4
EN5
EN6
U5 74LS137
CC1 SEL*
CC2 SEL*
CC3 SEL*
CC4 SEL*
CC5 SEL*
CC6 SEL*
U3 74HCT574
CC1 FRE*
CC2 FRE*
CC3 FRE*
CC4 FRE*
CC5 FRE*
CC6 FRE*
ADDR 7
ADDR 6
ADDR 5
ADDR 4
ADDR 3
ADDR 2
ADDR 1
ADDR 0
RD*
U6 74LS138
CDONE1
CDONE2
CDONE3
CDONE4
CDONE5
CDONE6
SYSRST*
U13A 74HCT74
DATA 0
DATA 1
DATA 2
DATA 3
DATA 4
DATA 5
DATA 6
DATA 7
U2 74HCT373
DN1
DN2
DN3
DN4
DN5
DN6
U4 74LS54
U15 74LS54
U9A 74HCT74
U9B 74HCT74
U10A 74HCT74
U10B 74HCT74
U16A 74HCT74
U16B 74HCT74
DONE 1
DONE 2
DONE 3
DONE 4
DONE 5
DONE 6
R2 2K
U14B
U14C
U14D
JW2
U11, 22K X 9
INTRQ*
+5V
GND
C1 22
C2—C8 0.1 (TYP)
C9—C16 .01 (TYP)
J1
J2
J3
J4
J5
J6
J7
J8
START / STOP*
INTRQ*
GND

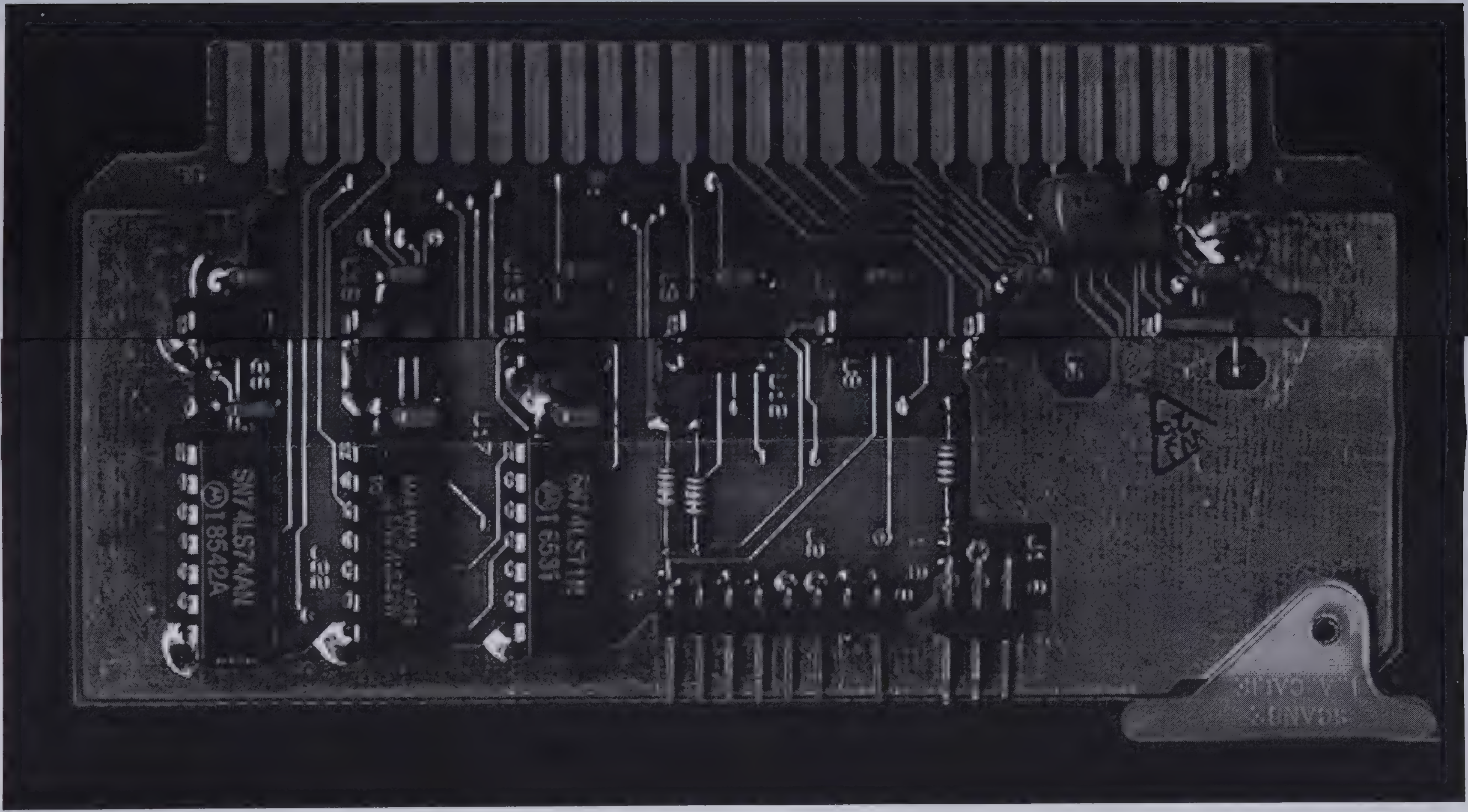
Figure 4-8. Type 796481-1, Receiver Collection Control (A4A15), Schematic Diagram 580445 (A)


SN74LS74AN
QQ8514
SN74LS11N
MALAYSIA 505C
U22
798

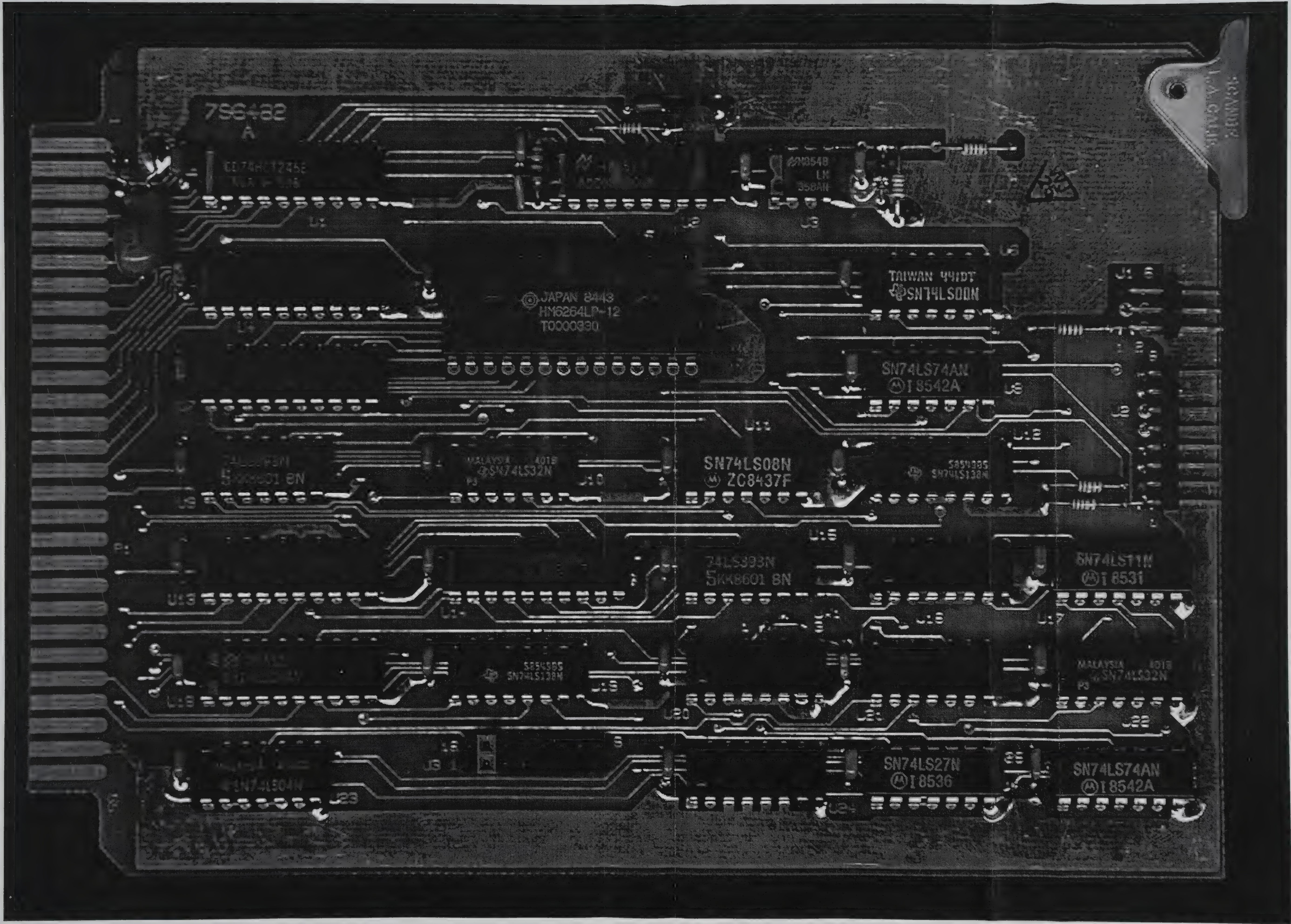
A4A16 RX-1 Collection


796482
PHILIPPINES 614EN
SN74HCT245N
U1
U2
U3
LM
358AN
JAPAN 8443
HM6264LP-12
TAIWAN 441DT
SN74LS00N
SN74LS74AN
QQ8514
SN74LS32N
SN74LS08N
ZC8437F
SN74LS138N
MALAYSIA
SN74LS393N
MALAYSIA 505CS
SN74LS11N
SN74LS138N
MALAYSIA 549BP
SN74LS161AN
SN74LS27N
I8536
SN74LS74AN
QQ8514
P1

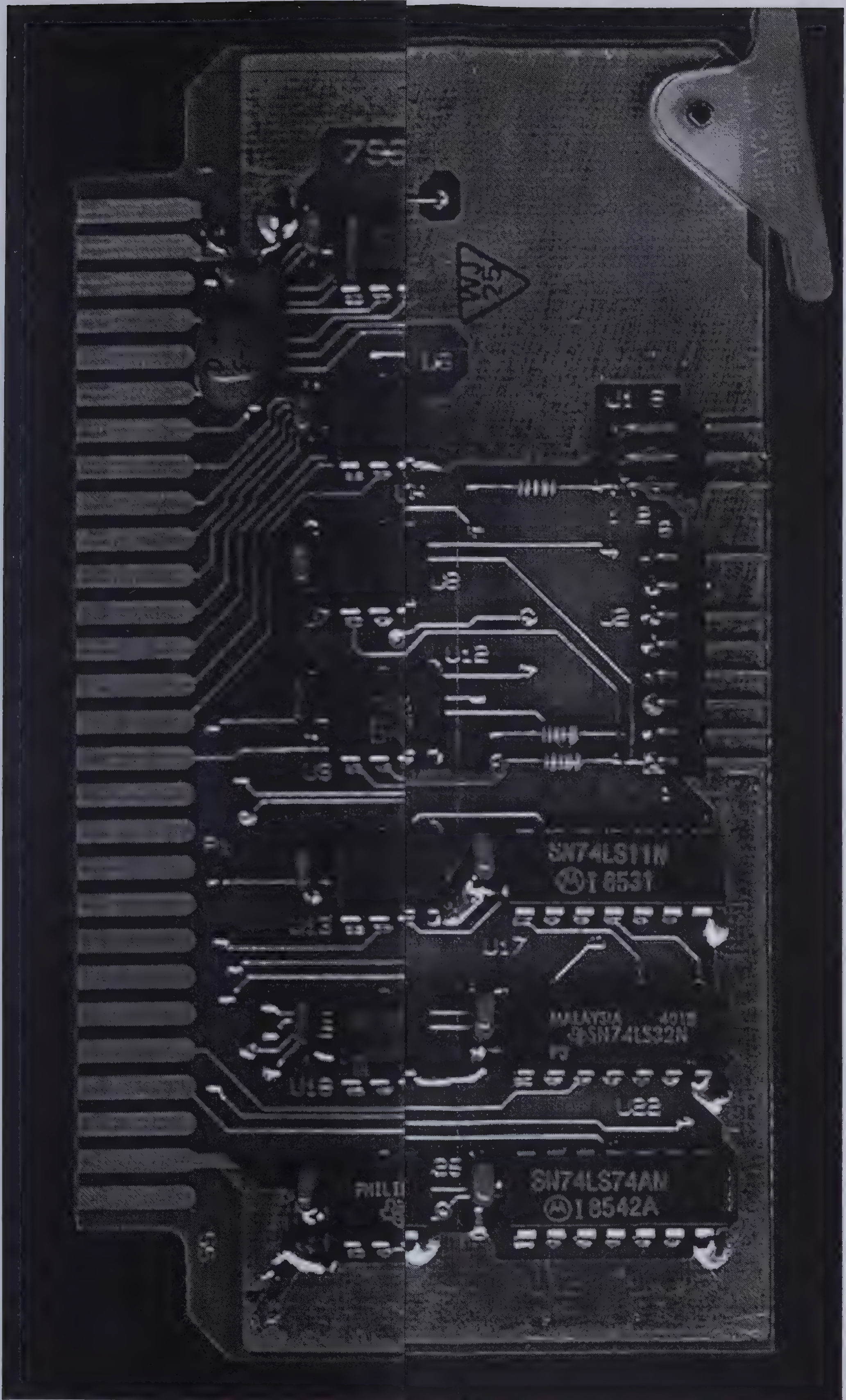
A4A16 RX-1 Collection


SN74LS11N
16531
SN74LS74AN
18542A

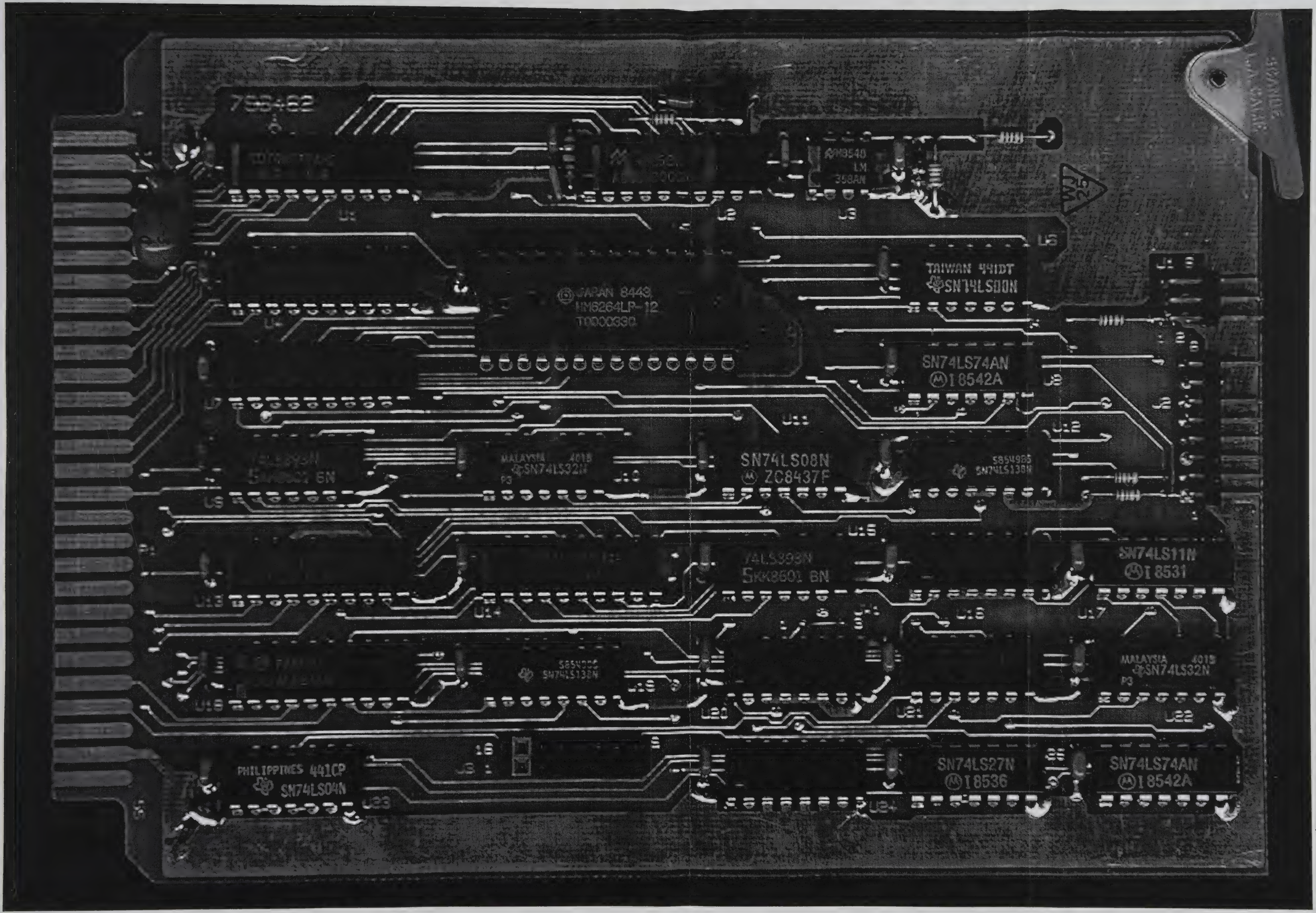
A4A17 RX-2 Collection


7S6482
A
CD74HCT245E
LM
358AN
JAPAN 8443
HM6264LP-12
T0000330
TAIWAN 441DT
SN74LS00N
SN74LS74AN
I8542A
MALAYSIA 401B
SN74LS32N
SN74LS08N
ZC8437F
SN74LS138N
74LS393N
5KK8601 BN
SN74LS11N
I8531
SN74LS138N
MALAYSIA 401B
SN74LS32N
SN74LS04N
SN74LS27N
I8536
SN74LS74AN
I8542A
U1
U2
U3
U6
U8
U9
U10
U12
U13
U15
U17
U18
U19
U20
U22
U23
U24
J1
J2
J3
P1

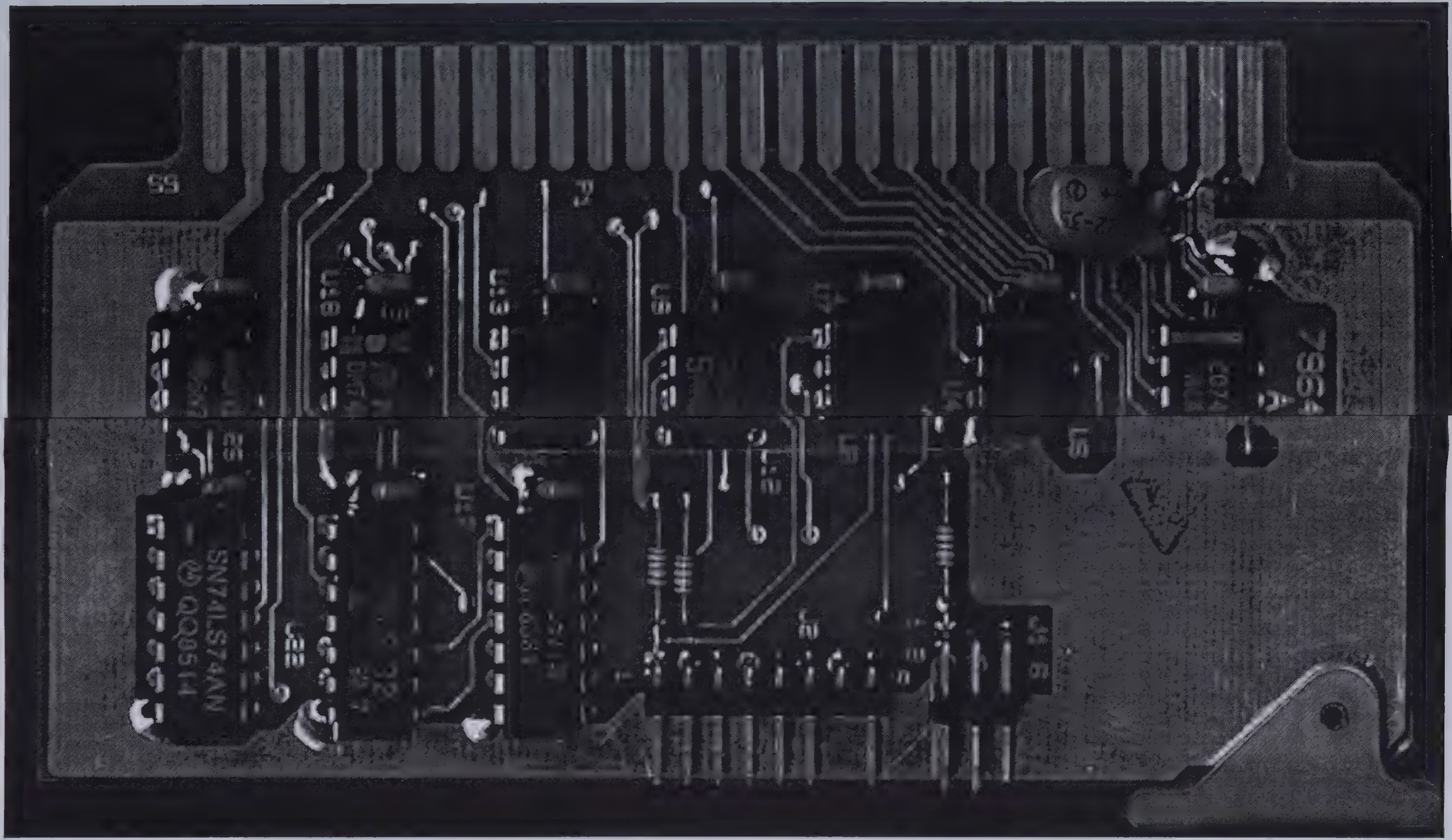
A4A17 RX-2 Collection


755
U6
U1
U8
U2
U12
U3
SN74LS11N
I 8531
U13
U17
MALAYSIA 401B
SN74LS32N
U16
U22
PHILI
SN74LS74AN
I 8542A

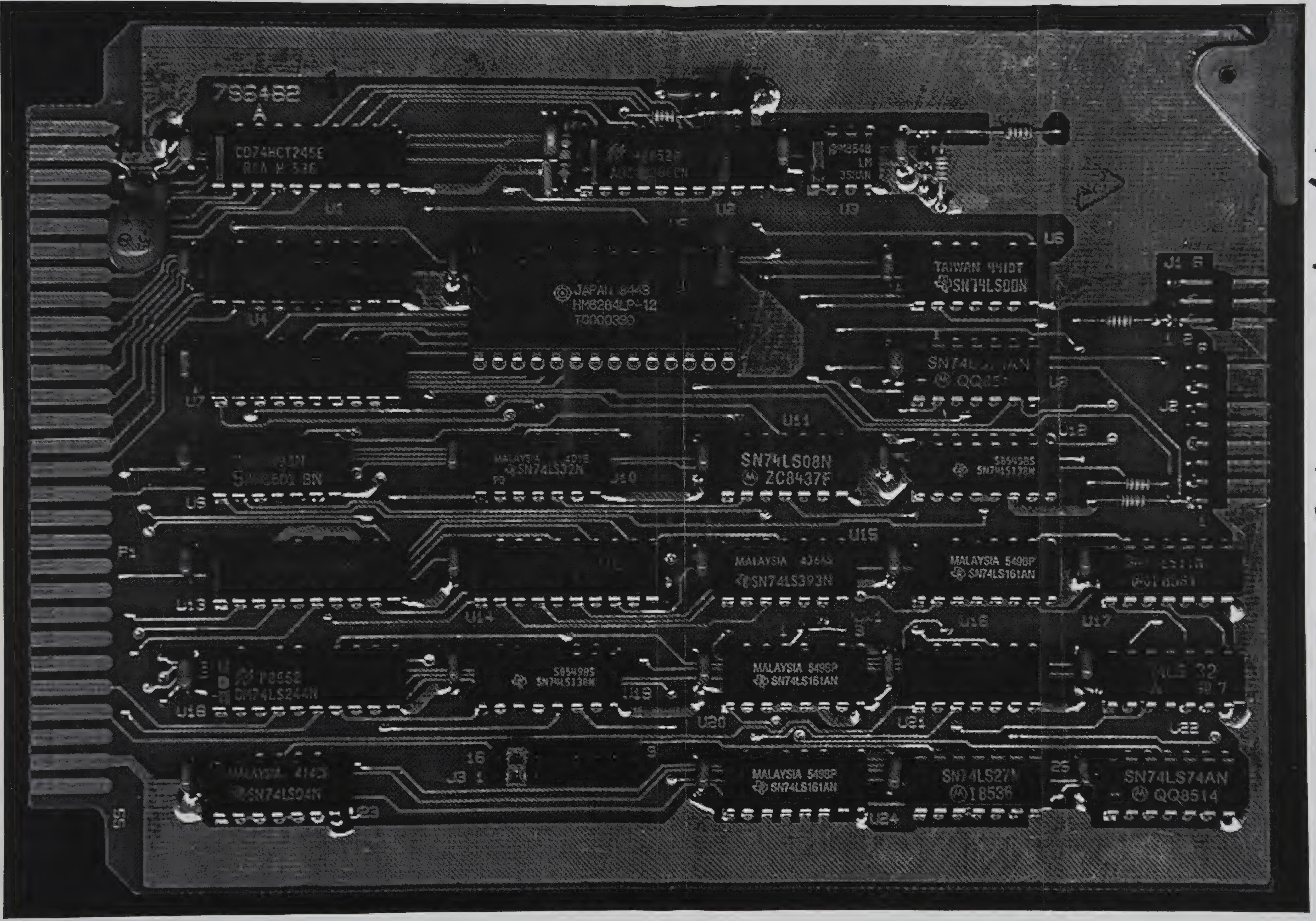
A4A18 RX-3 Collection


795482
AM8540
LM
358AN
U1
U2
U3
U4
U5
TAIWAN 441DT
SN74LS00N
JAPAN 8443
HM6264LP-12
T0000330
SN74LS74AN
I8542A
U7
U8
U11
U12
74LS393N
SKK8601 BN
MALAYSIA 401B
SN74LS32N
P3
U10
SN74LS08N
ZC8437F
S8549BS
SN74LS138N
U9
U15
74LS393N
SKK8601 BN
SN74LS11N
I8531
U13
U14
U16
U17
S8549BS
SN74LS138N
MALAYSIA 401B
SN74LS32N
P3
U18
U19
U20
U21
U22
PHILIPPINES 441CP
SN74LS04N
U23
U24
SN74LS27N
I8536
SN74LS74AN
I8542A

A4A18 RX-3 Collection


SN74LS74AN
QQ8514
7864

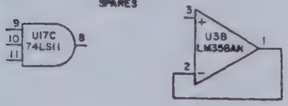
A4A19 RX4 Collection

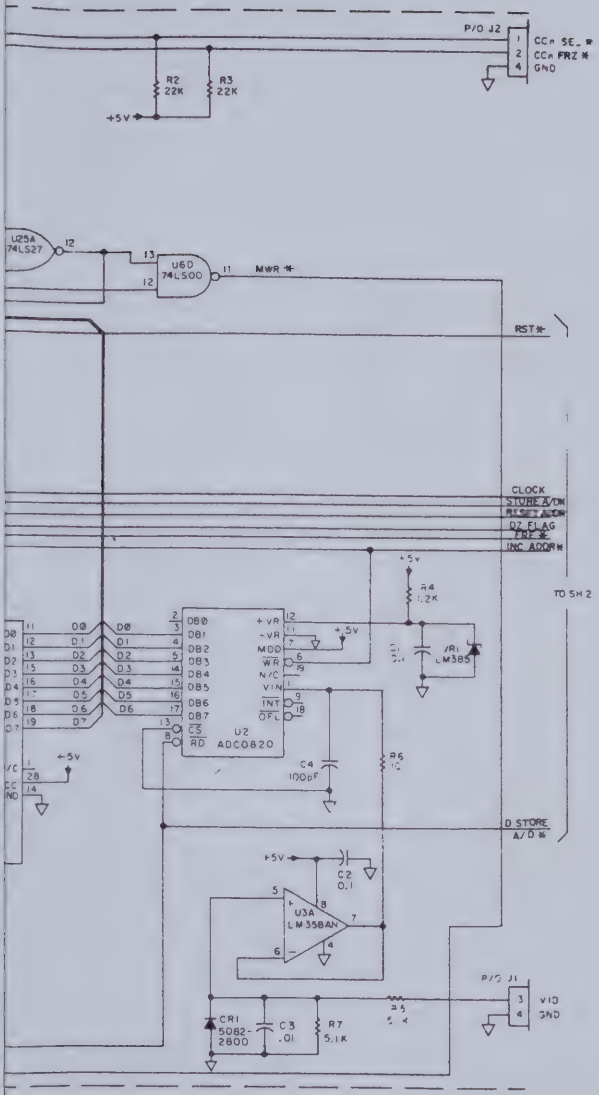

786482
CD74HCT245E
U1
U2
U3
U4
U6
JAPAN 8443
HM6264LP-12
T0000330
TAIWAN 441DT
SN74LS00N
J1
J2
U7
U8
U9
U10
U11
U12
SN74LS32N
SN74LS08N
ZC8437F
SN74LS138N
P1
U13
U14
U15
U16
U17
MALAYSIA
SN74LS393N
MALAYSIA 5498P
SN74LS161AN
DM74LS244N
U18
U19
U20
U21
U22
J3
SN74LS04N
U23
U24
SN74LS27N
18536
SN74LS74AN
QQ8514

A4A19 RX4 Collection

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN μF.
b) RESISTANCE IS IN OHMS, ±5%, 1/8W.
2. a) U6, U8, U9, U10, U11, U15, U17, U21, U22, U23, U25, U26 PIN 7 IS GND AND PIN 14 IS V_{CC}
b) U12, U16, U19, U20, U24 PIN 8 IS GND AND PIN 16 IS V_{CC}.
c) U1, U2, U4, U7, U13, U14, U18 PIN 10 IS GND AND PIN 20 IS V_{CC}.

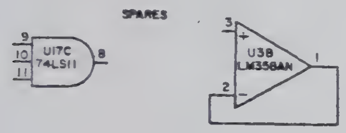
SPARES


9
10
11
U17C
74LS11
8
3
2
U3B
LM358AN
1


P/O J2
1 CCn SEL *
2 CCn FRZ *
4 GND
R2 22K
R3 22K
+5V
U25A 74LS27
12
13
U6D 74LS00
11
MWR *
RST *
CLOCK
STORE A/D*
RESET ADR
DZ FLAG
FRZ *
INC ADDR*
TO SH 2
D0 D1 D2 D3 D4 D5 D6 D7
DB0 DB1 DB2 DB3 DB4 DB5 DB6 DB7
CS
RD
+VR
-VR
MOD
WR
N/C
VIN
INT
OFL
U2
ADC0820
+5V
R4 1.2K
VR1 LM385
C4 100pF
R6
D STORE A/D *
+5V
C2 0.1
U3A LM358AN
5 6 7 8 4
P/O J1
3 VID
4 GND
R5
CR1 5082-2800
C3 .01
R7 5.1K
N/C
VCC
GND
28
14

e 796482-1, Receiver Collection (A4A16-A4A19),
ematic Diagram 580470 (Sheet 1 of 2) (B)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN µF.
b) RESISTANCE IS IN OHMS, ±5%, 1/8W.
2. a) U6, U8, U9, U10, U11, U15, U17, U21, U22, U23, U25, U26 PIN 7 IS GND AND PIN 14 IS V_{CC}
b) U12, U16, U19, U20, U24 PIN 8 IS GND AND PIN 16 IS V_{CC}.
c) U1, U2, U4, U7, U13, U14, U18 PIN 10 IS GND AND PIN 20 IS V_{CC}.


SPARES
U17C
74LS11
U3B
LM358AN

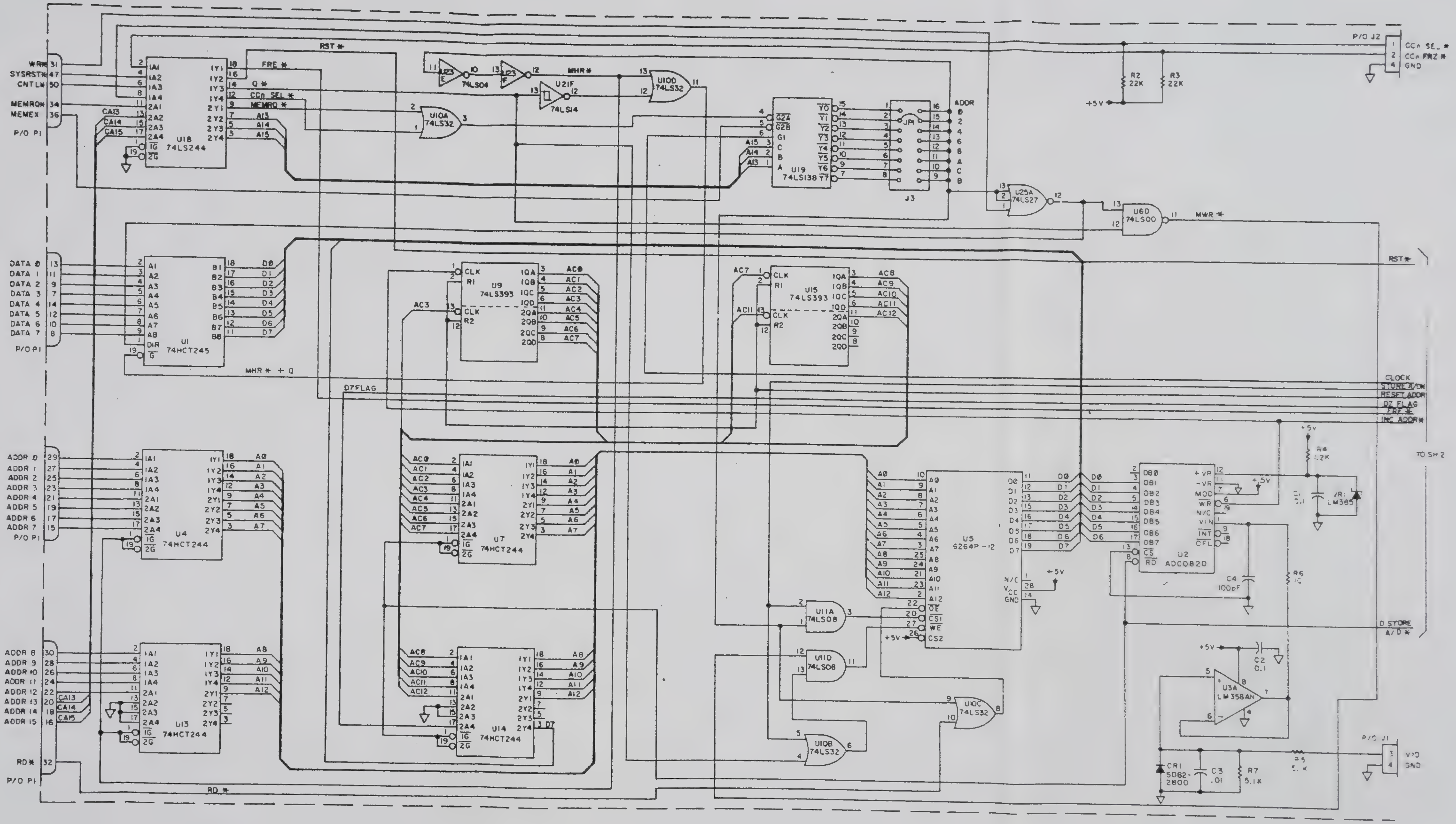
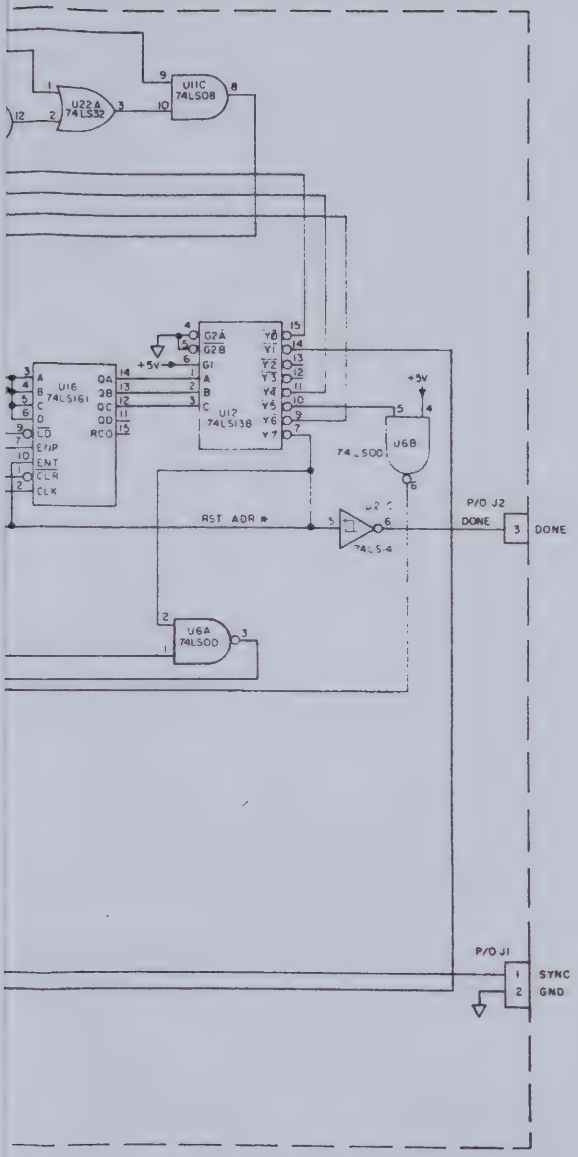

WR*
SYSRST*
CNTL*
MEMRQ*
MEMEX
P/O P1
CA13
CA14
CA15
U18
74LS244
RST*
FRE*
Q*
CCn SEL*
MEMRQ*
A13
A14
A15
U23 E
U23 F
74LS04
MHR*
U21F
74LS14
U10D
74LS32
U10A
74LS32
U19
74LS138
JP1
J3
ADDR
U25A
74LS27
U60
74LS00
MWR*
P/O J2
CCn SEL*
CCn FRZ*
GND
R2 22K
R3 22K
+5V
DATA 0
DATA 1
DATA 2
DATA 3
DATA 4
DATA 5
DATA 6
DATA 7
U1
74HCT245
MHR* + Q
D0
D1
D2
D3
D4
D5
D6
D7
U9
74LS393
AC0
AC1
AC2
AC3
AC4
AC5
AC6
AC7
U15
74LS393
AC8
AC9
AC10
AC11
AC12
D7FLAG
CLOCK
STORE A/D*
RESET ADDR
D7 FLAG
FRE*
INC ADDR*
TO SH 2
ADDR 0
ADDR 1
ADDR 2
ADDR 3
ADDR 4
ADDR 5
ADDR 6
ADDR 7
U4
74HCT244
A0
A1
A2
A3
A4
A5
A6
A7
U7
74HCT244
ADDR 8
ADDR 9
ADDR 10
ADDR 11
ADDR 12
ADDR 13
ADDR 14
ADDR 15
U13
74HCT244
A8
A9
A10
A11
A12
U14
74HCT244
RD*
U5
6264P-12
N/C
VCC
GND
OE
CS1
WE
CS2
U11A
74LS08
U11D
74LS08
U10C
74LS32
U10B
74LS32
U2
ADC0820
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
+VR
-VR
MOD
WR
N/C
VIN
INT
OFL
CS
RD
R4 1.2K
VR1 LM385
C4 100pF
D STORE A/D*
C2 0.1
U3A
LM358AN
CR1 5082-2800
C3 .01
R7 5.1K
P/O J1
VID
GND

Figure 4-9. Type 796482-1, Receiver Collection (A4A16-A4A19), Schematic Diagram 580470 (Sheet 1 of 2) (B)


U11C
74LS08
U22A
74LS32
U16
74LS161
A
B
C
D
LD
ENP
ENT
CLR
CLK
QA
QB
QC
QD
RCO
U17
74LS138
G2A
G2B
G1
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
+5V
+5V
U6B
74LS00
U2C
74LS14
RST ADR *
U6A
74LS00
P/O J2
DONE
3
DONE
P/O J1
1
SYNC
2
GND

e 796482-1, Receiver Collection (A4A16-A4A19),
ematic Diagram 580470 (Sheet 2 of 2) (B)

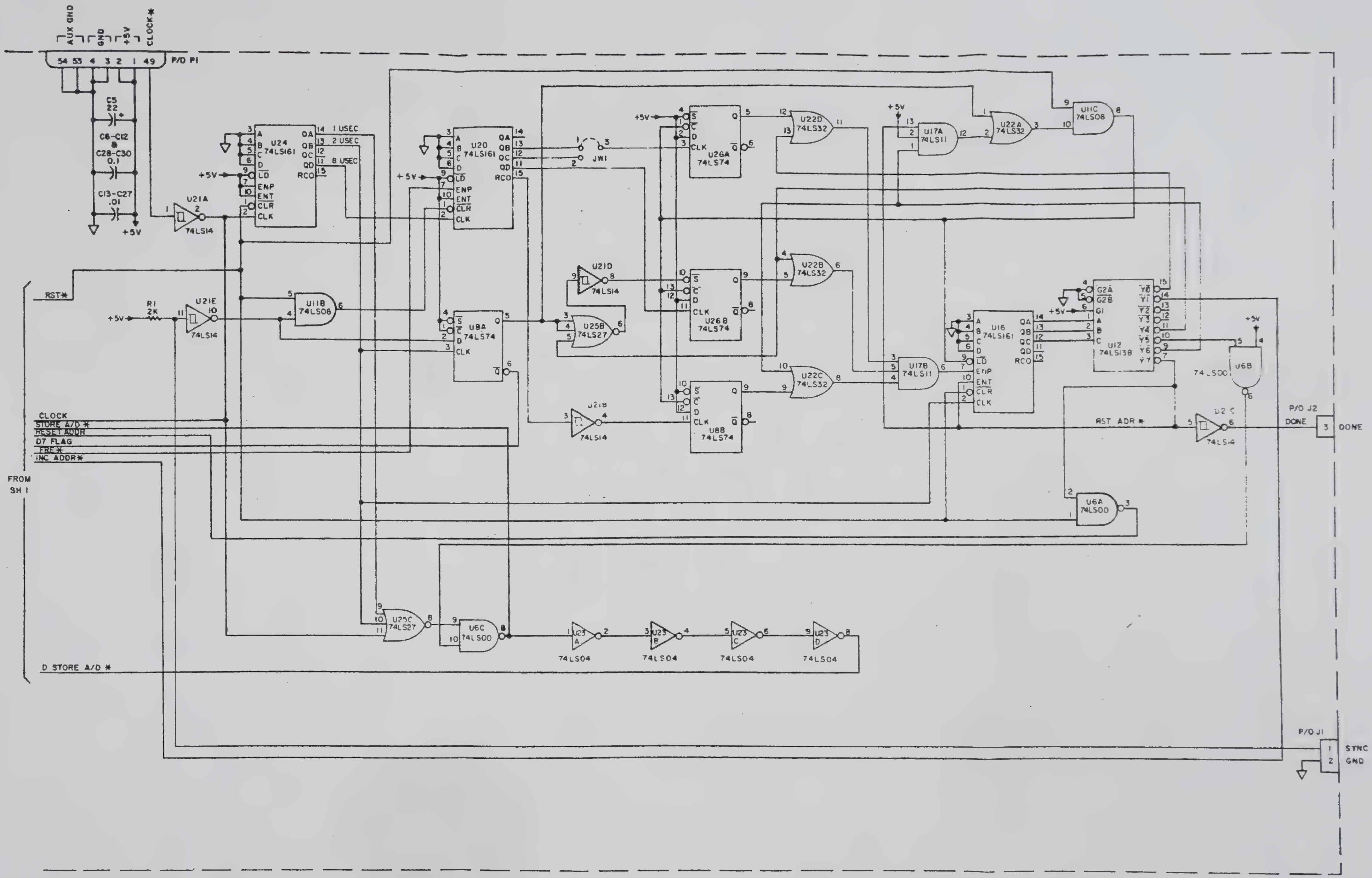
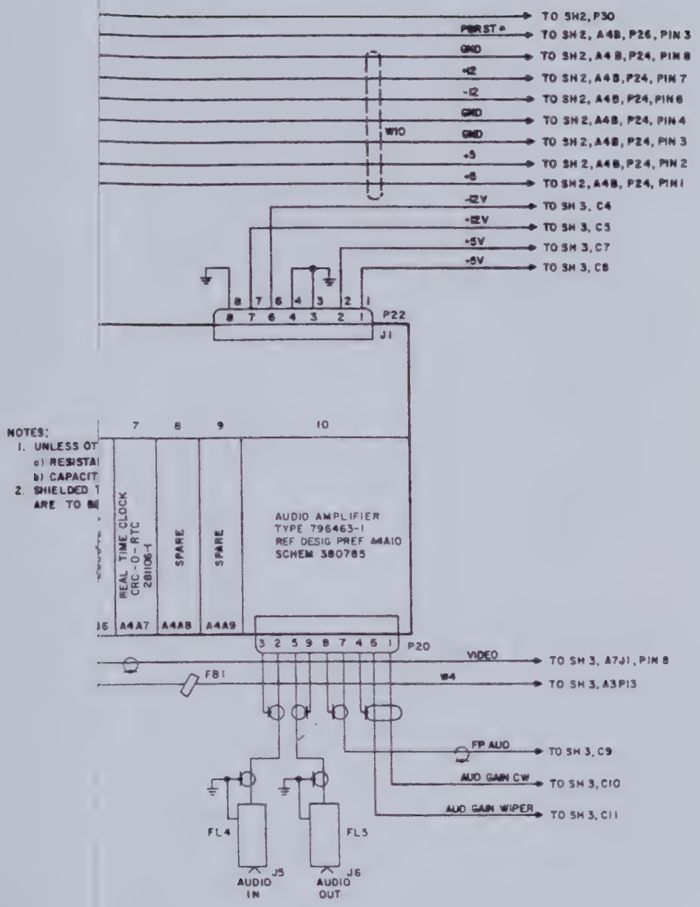
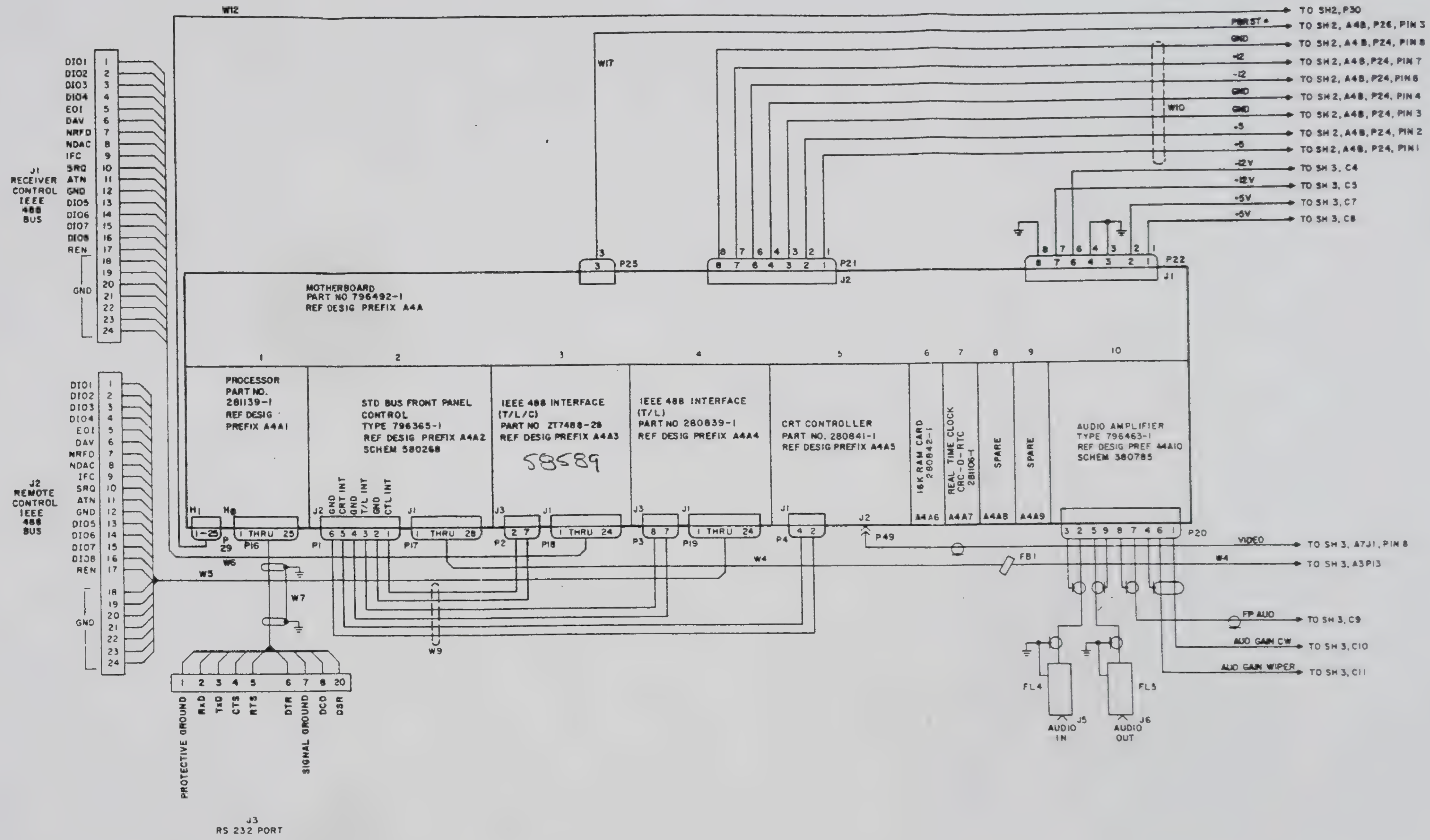

AUX GND
GND
+5V
CLOCK *
P/O P1
C5 22
C6-C12 & C28-C30 0.1
C13-C27 .01
+5V
U21A 74LS14
U24 74LS161
1 USEC
2 USEC
8 USEC
U20 74LS161
JW1
U26A 74LS74
U22D 74LS32
U17A 74LS11
U22A 74LS32
U11C 74LS08
U21D 74LS14
U26B 74LS74
U22B 74LS32
U25B 74LS27
U8A 74LS74
U11B 74LS08
U21E 74LS14
R1 2K
RST *
U21B 74LS14
U8B 74LS74
U22C 74LS32
U17B 74LS11
U16 74LS161
U12 74LS138
U6B 74LS00
RST ADR *
U2 C 74LS14
P/O J2
DONE
CLOCK
STORE A/D *
RESET ADDR
D7 FLAG
FRE *
INC ADDR *
FROM SH 1
U6A 74LS00
U25C 74LS27
U6C 74LS00
U23 A 74LS04
U23 B 74LS04
U23 C 74LS04
U23 D 74LS04
D STORE A/D *
P/O J1
SYNC
GND

Figure 4-9. Type 796482-1, Receiver Collection (A4A16-A4A19), Schematic Diagram 580470 (Sheet 2 of 2) (B)


TO SH2, P30
PWR ST *
TO SH 2, A4B, P26, PIN 3
GND
TO SH 2, A4 B, P24, PIN 8
+12
TO SH 2, A4B, P24, PIN 7
-12
TO SH 2, A4B, P24, PIN 6
GND
TO SH 2, A4B, P24, PIN 4
W10
GND
TO SH 2, A4B, P24, PIN 3
+5
TO SH 2, A4B, P24, PIN 2
+5
TO SH 2, A4B, P24, PIN 1
-12V
TO SH 3, C4
+12V
TO SH 3, C5
+5V
TO SH 3, C7
+5V
TO SH 3, C8
8 7 6 4 3 2 1
P22
J1
NOTES:
1. UNLESS OT
a) RESISTA
b) CAPACIT
2. SHIELDED
ARE TO BE
7
8
9
10
REAL TIME CLOCK CRC-0-RTC 281106-1
SPARE
SPARE
AUDIO AMPLIFIER
TYPE 796463-1
REF DESIG PREF A4A10
SCHEM 380785
A4A7
A4A8
A4A9
3 2 5 9 8 7 4 6 1
P20
VIDEO
TO SH 3, A7J1, PIN 8
FB1
W4
TO SH 3, A3P13
FP AUD
TO SH 3, C9
AUD GAIN CW
TO SH 3, C10
AUD GAIN WIPER
TO SH 3, C11
FL4
FL5
J5
AUDIO IN
J6
AUDIO OUT

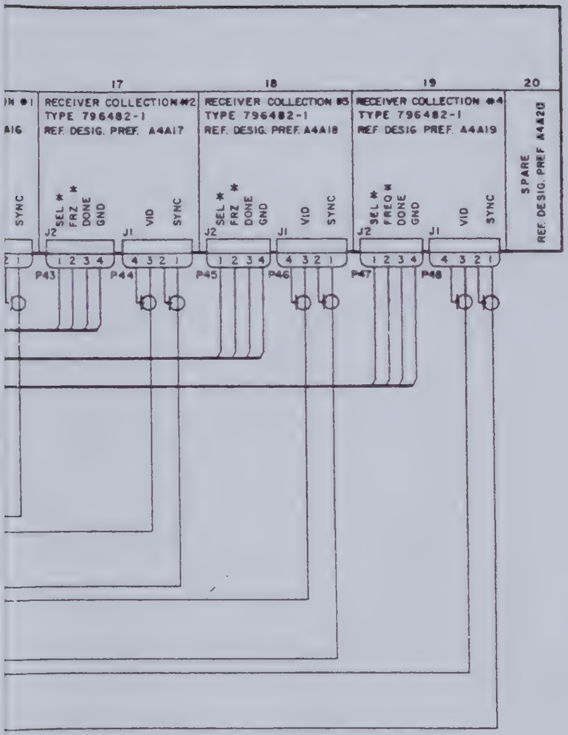
-10. WJ-8610A-1, Controller Main Chassis Schematic Diagram 580399 (Sheet 1 of 3) (F)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS IN µF.
2. SHIELDED TWO OR THREE CONDUCTOR WIRES ARE TO BE TWISTED.



J1 RECEIVER CONTROL IEEE 488 BUS
DIO1 DIO2 DIO3 DIO4 EOI DAV NRFD NDAC IFC SRQ ATN GND DIO5 DIO6 DIO7 DIO8 REN GND
J2 REMOTE CONTROL IEEE 488 BUS
W12
W17
W10
W5
W6
W7
W9
W4
MOTHERBOARD
PART NO 796492-1
REF DESIG PREFIX A4A
P25
P21
P22
PROCESSOR PART NO. 281139-1 REF DESIG PREFIX A4A1
STD BUS FRONT PANEL CONTROL TYPE 796365-1 REF DESIG PREFIX A4A2 SCHEM 580268
GND CRT INT GND T/L INT GND CTL INT
IEEE 488 INTERFACE (T/L/C) PART NO 2T7488-28 REF DESIG PREFIX A4A3
58589
IEEE 488 INTERFACE (T/L) PART NO 280839-1 REF DESIG PREFIX A4A4
CRT CONTROLLER PART NO. 280841-1 REF DESIG PREFIX A4A5
16K RAM CARD 280842-1
A4A6
REAL TIME CLOCK CRC-0-RTC 281106-1
A4A7
SPARE
A4A8
SPARE
A4A9
AUDIO AMPLIFIER TYPE 796463-1 REF DESIG PREF A4A10 SCHEM 380785
1-25
1 THRU 25
P16
P29
1 THRU 28
P17
1 THRU 24
P18
P19
P49
P20
PWRST*
TO SH2, P30
TO SH 2, A4B, P26, PIN 3
GND
TO SH 2, A4B, P24, PIN 8
+12
TO SH 2, A4B, P24, PIN 7
-12
TO SH 2, A4B, P24, PIN 6
GND
TO SH 2, A4B, P24, PIN 4
GND
TO SH 2, A4B, P24, PIN 3
+5
TO SH 2, A4B, P24, PIN 2
+5
TO SH 2, A4B, P24, PIN 1
-12V
TO SH 3, C4
+12V
TO SH 3, C5
+5V
TO SH 3, C7
-5V
TO SH 3, C8
VIDEO
TO SH 3, A7J1, PIN 8
FB1
TO SH 3, A3P13
FP AUD
TO SH 3, C9
AUD GAIN CW
TO SH 3, C10
AUD GAIN WIPER
TO SH 3, C11
FL4
FL5
J5 AUDIO IN
J6 AUDIO OUT
PROTECTIVE GROUND RxD TxD CTS RTS DTR SIGNAL GROUND DCD DSR
J3 RS 232 PORT

Figure 4-10. WJ-8610A-1, Controller Main Chassis Schematic Diagram 580399 (Sheet 1 of 3) (F)


17
18
19
20
RECEIVER COLLECTION #2
TYPE 796482-1
REF. DESIG. PREF. A4A17
RECEIVER COLLECTION #3
TYPE 796482-1
REF. DESIG. PREF. A4A18
RECEIVER COLLECTION #4
TYPE 796482-1
REF. DESIG. PREF. A4A19
SPARE
REF. DESIG. PREF. A4A20
A16
SYNC
SEL *
FRZ *
FREQ *
DONE
GND
VID
SYNC
J2
J1
1 2 3 4
4 3 2 1
P43
P44
P45
P46
P47
P48

WJ-8610A-1, Controller Main Chassis
Schematic Diagram 580399 (Sheet 2 of 3) (F)

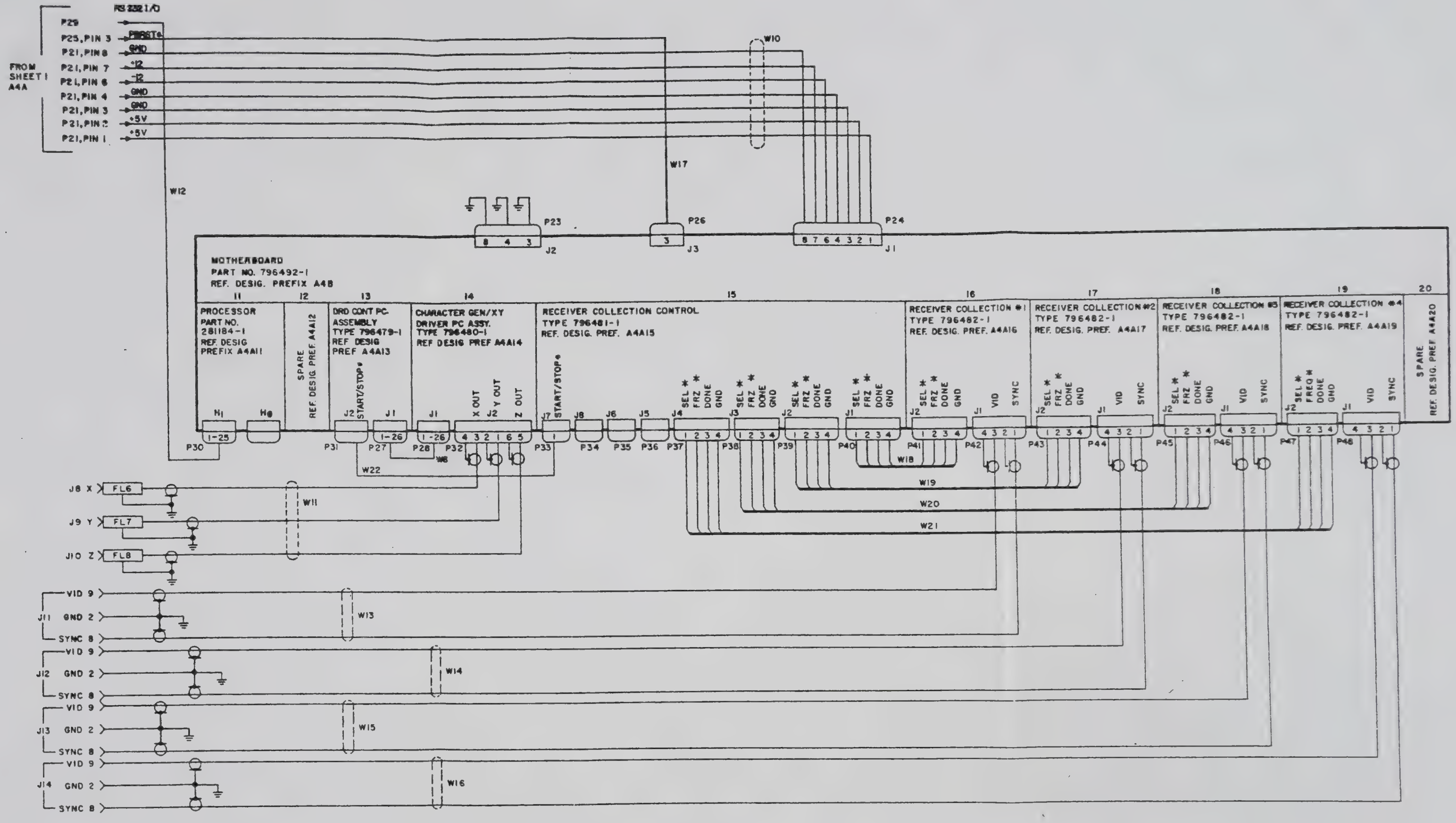
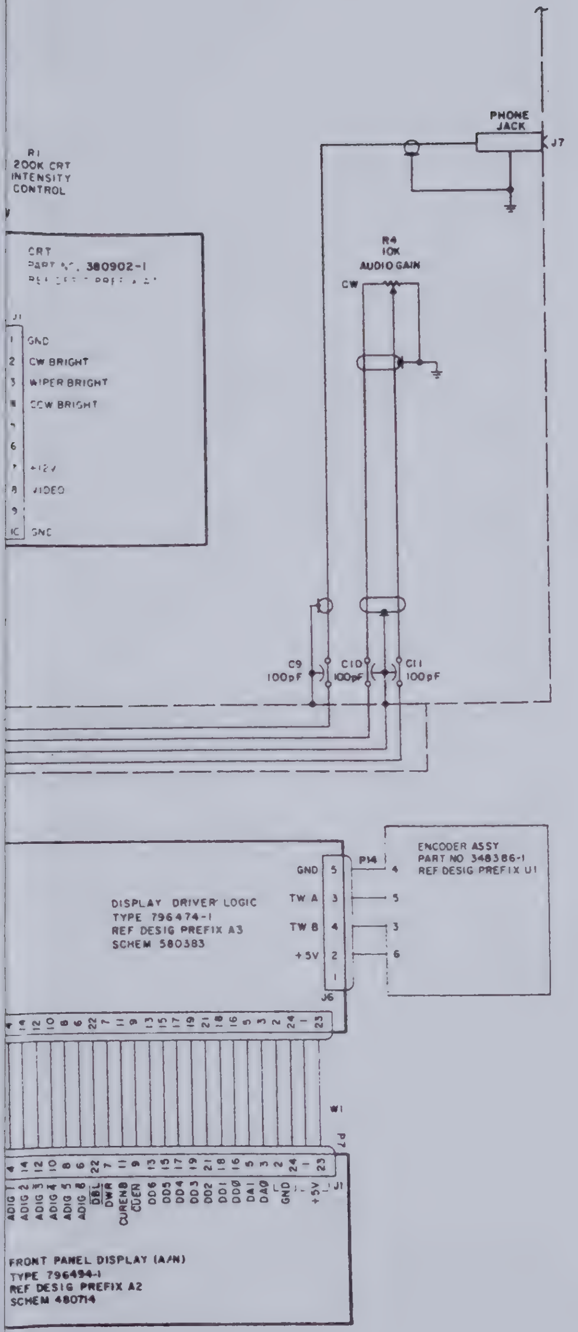

RS232 I/O
P29
P25, PIN 3
P21, PIN 8
P21, PIN 7
P21, PIN 6
P21, PIN 4
P21, PIN 3
P21, PIN 2
P21, PIN 1
FROM SHEET 1 A4A
RESET*
GND
+12
-12
GND
GND
+5V
+5V
W10
W12
W17
P23
P26
P24
J2
J3
J1
MOTHERBOARD
PART NO. 796492-1
REF. DESIG. PREFIX A4B
11
12
13
14
15
16
17
18
19
20
PROCESSOR
PART NO. 281184-1
REF. DESIG PREFIX A4A11
SPARE
REF. DESIG. PREF. A4A12
DRD CONT PC. ASSEMBLY
TYPE 796479-1
REF DESIG PREF A4A13
CHARACTER GEN/XY DRIVER PC ASSY.
TYPE 796480-1
REF DESIG PREF A4A14
RECEIVER COLLECTION CONTROL
TYPE 796481-1
REF. DESIG. PREF. A4A15
RECEIVER COLLECTION #1
TYPE 796482-1
REF. DESIG. PREF. A4A16
RECEIVER COLLECTION #2
TYPE 796482-1
REF. DESIG. PREF. A4A17
RECEIVER COLLECTION #3
TYPE 796482-1
REF. DESIG. PREF. A4A18
RECEIVER COLLECTION #4
TYPE 796482-1
REF. DESIG. PREF. A4A19
SPARE
REF. DESIG. PREF. A4A20
START/STOP*
X OUT
Y OUT
Z OUT
SEL *
FRZ *
FREQ *
DONE
GND
VID
SYNC
P30
P31
P27
P28
P32
P33
P34
P35
P36
P37
P38
P39
P40
P41
P42
P43
P44
P45
P46
P47
P48
W8
W11
W13
W14
W15
W16
W18
W19
W20
W21
W22
J8 X
J9 Y
J10 Z
FL6
FL7
FL8
J11
J12
J13
J14
VID 9
GND 2
SYNC 8

Figure 4-10. WJ-8610A-1, Controller Main Chassis Schematic Diagram 580399 (Sheet 2 of 3) (F)


PHONE JACK
J7
R1
200K CRT INTENSITY CONTROL
CRT
PART NO. 380902-1
J1
1 GND
2 CW BRIGHT
3 WIPER BRIGHT
4 CCW BRIGHT
5
6
7 +12V
8 VIDEO
9
10 GND
R4
10K
AUDIO GAIN
CW
C9
100pF
C10
100pF
C11
100pF
DISPLAY DRIVER LOGIC
TYPE 796474-1
REF DESIG PREFIX A3
SCHEM 580383
GND 5
TW A 3
TW B 4
+5V 2
1
J6
P14
4
5
3
6
ENCODER ASSY
PART NO 348386-1
REF DESIG PREFIX U1
4 14 12 10 8 6 22 7 11 9 13 15 17 19 21 18 16 5 3 2 24 1 23
W1
P7
ADIG 1
ADIG 2
ADIG 3
ADIG 4
ADIG 5
ADIG 8
DBL
DWR
CURENB
CUEN
DD6
DD5
DD4
DD3
DD2
DD1
DD0
DA1
DA0
GND
+5V
J1
FRONT PANEL DISPLAY (A/N)
TYPE 796494-1
REF DESIG PREFIX A2
SCHEM 480714

WJ-8610A-1, Controller Main Chassis Schematic Diagram 580399 (Sheet 3 of 3) (F)

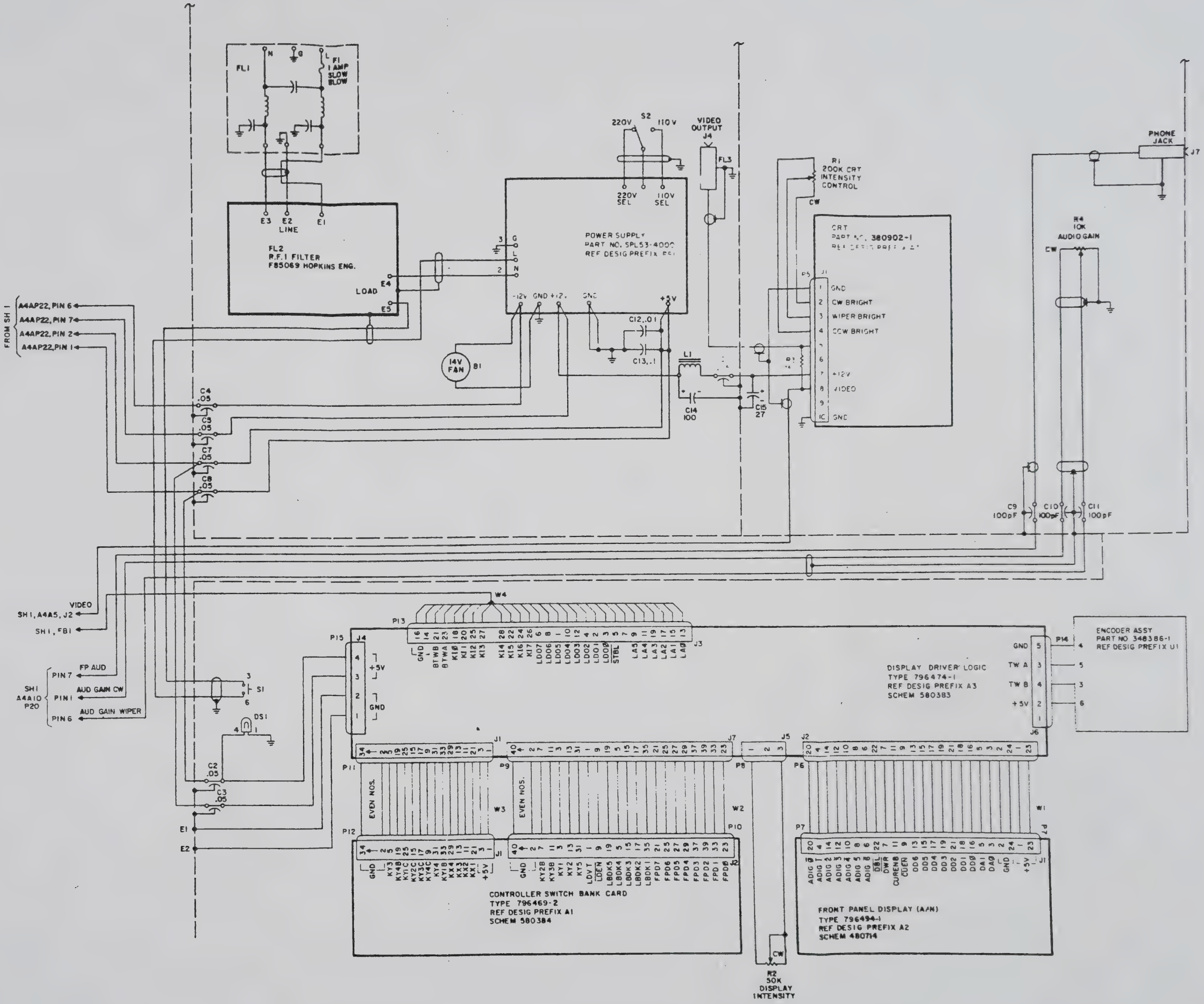
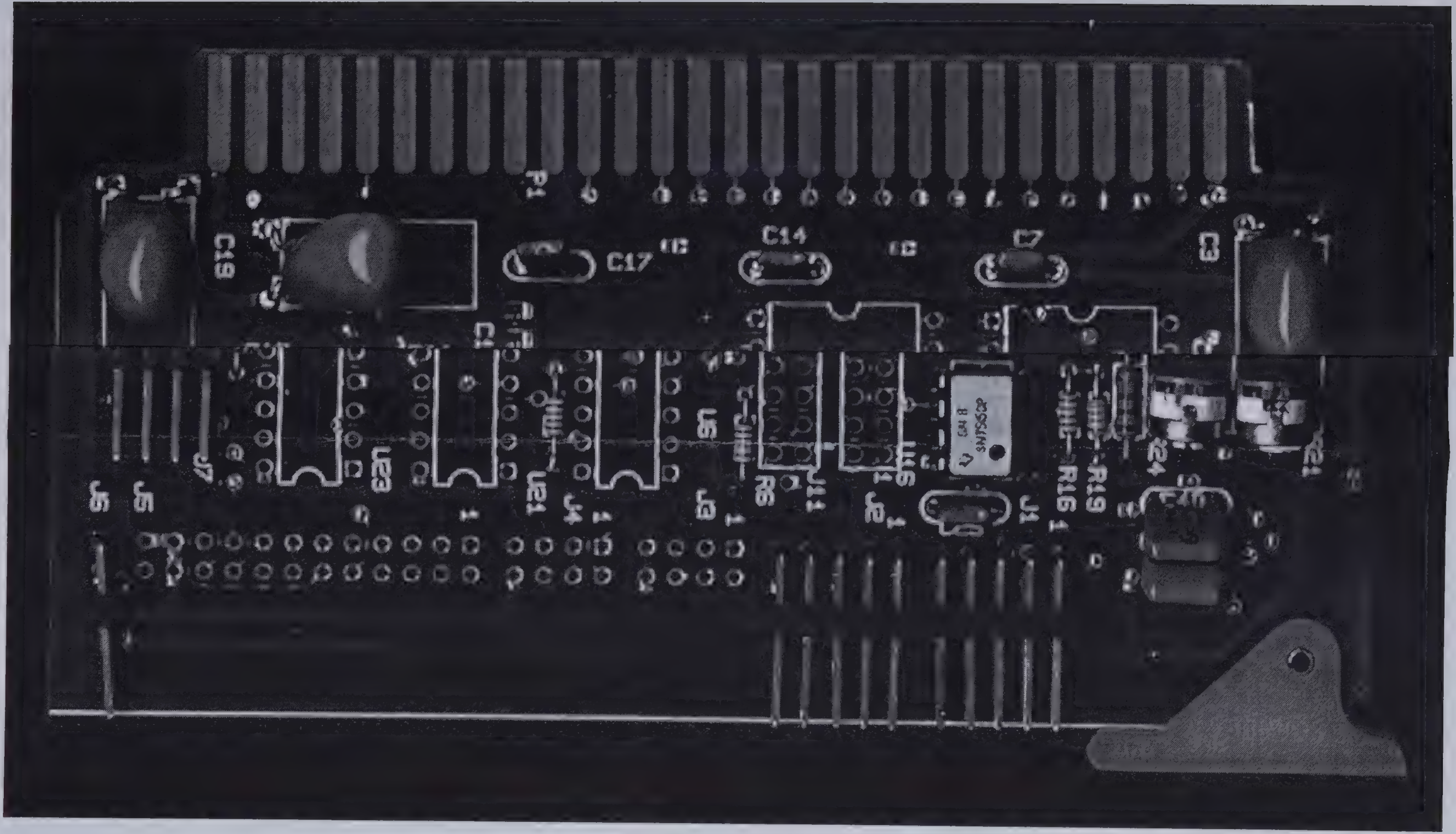
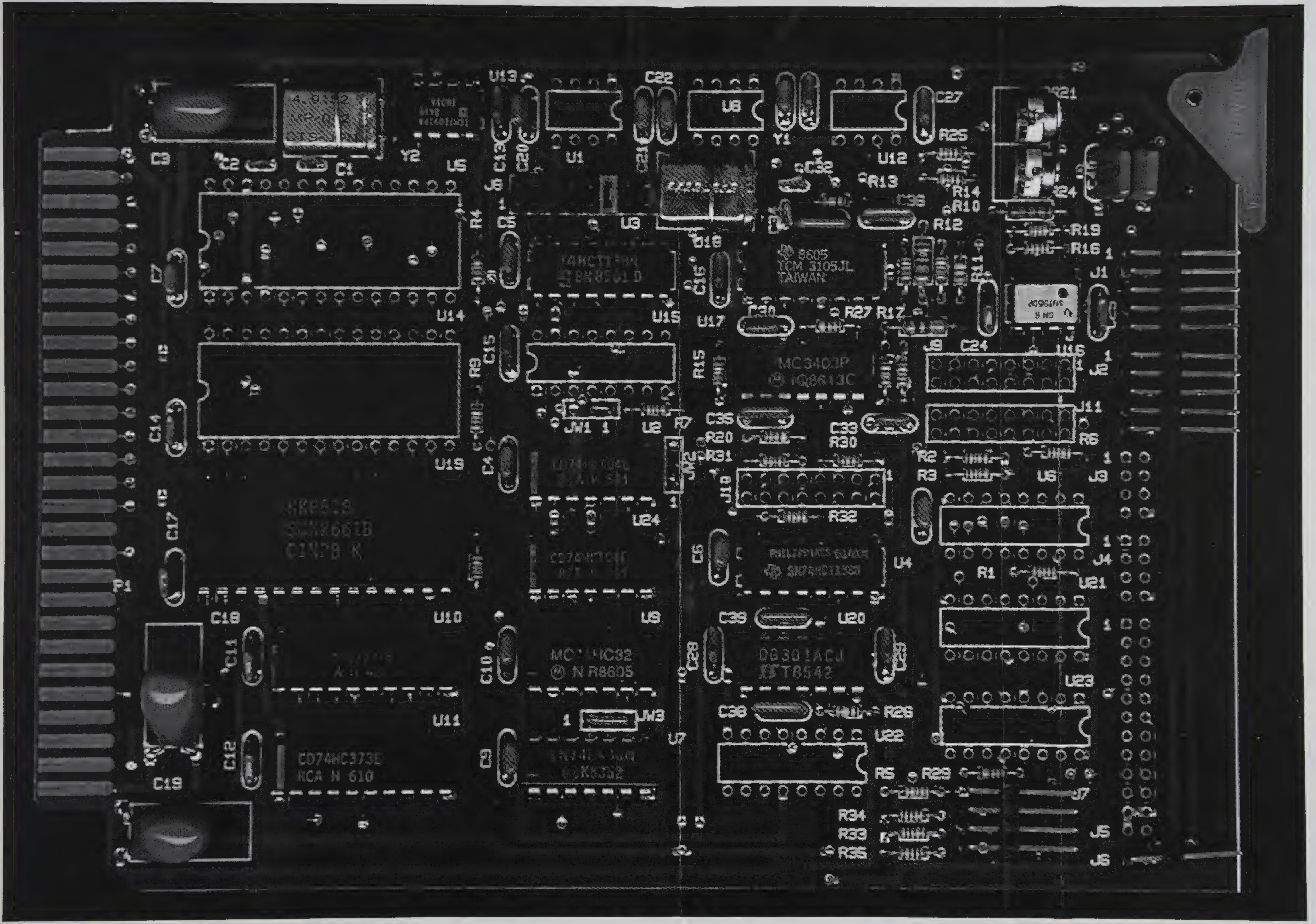

FL1
N
G
L
F1 1 AMP SLOW BLOW
E3 E2 E1
LINE
FL2 R.F.I FILTER F85069 HOPKINS ENG.
LOAD
E4
E5
S2
220V
110V
220V SEL
110V SEL
VIDEO OUTPUT J4
FL3
POWER SUPPLY PART NO. SPL53-4000 REF DESIG PREFIX PS1
3 G
L
2 N
-12V GND +12V GND +5V
C12, .01
C13, .1
14V FAN B1
L1
C14 100
C15 27
R1 200K CRT INTENSITY CONTROL
CW
CRT PART NO. 380902-1
P5 J1
1 GND
2 CW BRIGHT
3 WIPER BRIGHT
4 CCW BRIGHT
5
6
7 +12V
8 VIDEO
9
10 GND
PHONE JACK
J7
R4 10K AUDIO GAIN
CW
C9 100pF
C10 100pF
C11 100pF
FROM SH 1
A4AP22, PIN 6
A4AP22, PIN 7
A4AP22, PIN 2
A4AP22, PIN 1
C4 .05
C5 .05
C7 .05
C8 .05
VIDEO
SH1, A4A5, J2
SH1, FB1
SH1 A4A10 P20
PIN 7 FP AUD
PIN 1 AUD GAIN CW
PIN 6 AUD GAIN WIPER
S1
3
6
DS1
4
1
C2 .05
C3 .05
E1
E2
W4
P13
P15
J4
+5V
GND
J3
GND BTWB BTWA K10 K11 K12 K13 K14 K15 K16 K17 LD07 LD06 LD05 LD04 LD03 LD02 LD01 LD00 STBL LA5 LA4 LA3 LA2 LA1 LA0
DISPLAY DRIVER LOGIC TYPE 796474-1 REF DESIG PREFIX A3 SCHEM 580383
GND
TW A
TW B
+5V
J6
P14
ENCODER ASSY PART NO 348386-1 REF DESIG PREFIX U1
J1
J7
J5
J2
P11
P9
P8
P6
EVEN NOS.
W3
W2
W1
P12
P10
P7
GND KY3 KY4B KY1C KY2C KY3C KY4C KY4 KY1B KX4 KX3 KX2 KX1 +5V
GND KY2B KY3B KY1 KY2 KY5 LDVT LDEN LBDK5 LBDK4 LBDK3 LBDK2 LBDK1 FPD7 FPD6 FPD5 FPD4 FPD3 FPD2 FPD1 FPD0
CONTROLLER SWITCH BANK CARD TYPE 796469-2 REF DESIG PREFIX A1 SCHEM 580384
ADIG 0 ADIG 1 ADIG 2 ADIG 3 ADIG 4 ADIG 5 ADIG 8 DBL DWR CURENB CUEN DD6 DD5 DD4 DD3 DD2 DD1 DD0 DA1 DA0 GND +5V
FRONT PANEL DISPLAY (A/N) TYPE 796494-1 REF DESIG PREFIX A2 SCHEM 480714
CW
R2 50K DISPLAY INTENSITY

Figure 4-10. WJ-8610A-1, Controller Main Chassis Schematic Diagram 580399 (Sheet 3 of 3) (F)


P1
C19
C17
C14
C7
C3
C1
U23
U21
U6
U16
J1
J2
J3
J4
J5
J6
J7
J11
R6
R16
R19
R21
R24
SN75...

A4AIO Serial I/O +


4.9152
MP-0?2
CTS
Y2
U5
C3
C2
C1
U13
C13
C20
U1
C22
C21
U8
Y1
U12
C27
R25
R21
C32
R13
R14
R10
R24
R19
R16
R12
C36
J8
U3
R4
C5
C7
U18
8605
TCM 3105JL
TAIWAN
74HCT1??N
SN8601 D
C16
R11
J1
U14
U15
U17
C30
R27
R17
J9
C24
U16
J2
R9
C15
R15
MC3403P
QQ8613C
C14
JW1
U2
R7
C35
C33
R20
R30
J11
R6
U19
C4
R31
JR2
R2
R3
U6
J3
J10
R32
C17
U24
C6
PHILIPPINES 610XM
SN74HCT138N
U4
J4
R1
U21
P1
C18
U10
U9
C39
U20
C11
C10
MC74HC32
N R8605
C28
DG301ACJ
T8542
C29
U23
U11
JW3
C38
R26
U22
C12
CD74HC373E
RCA H 610
C9
U7
C19
R5
R29
J7
R34
R33
R35
J5
J6

A4A10 Serial I/O +

WJ-8610A-5 SUPPLEMENT
FOR THE
WJ-8610A-1 INSTRUCTION MANUAL

The WJ-8610A-5 is identical to the WJ-8610A-1 except for two additional connectors on the rear panel, additional I/O Audio Assembly and several additional Screen Displays and Soft Keys.

WATKINS-JOHNSON COMPANY
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794

September 1986

WJ-8610A-5 SUPPLEMENT
FOR THE
WJ-8610A-1 INSTRUCTION MANUAL

The WJ-8610A-5 is identical to the WJ-8610A-1 except for two additional connectors on the rear panel, additional I/O Audio Assembly and several additional Screen Displays and Soft Keys.

WATKINS-JOHNSON COMPANY
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794

September 1986

WJ-8610A-5 SUPPLEMENT

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1-7 Type WJ-8610A-5, Controller, Main Chassis, Schematic Diagram 580665 (03) (Sheet 3 of 3) 1-19

WJ-8610A-5 SUPPLEMENT

FOR THE WJ-8610A-1 INSTRUCTION MANUAL

1.0 GENERAL

The WJ-8610A-5 is identical to the WJ-8610A-1 except for an additional assembly, several additional Screen Displays, additional Soft Keys and two connectors added to the Rear Panel of the Controller. The additional I/O Audio Assembly requires a new Main Chassis Schematic. The new schematic number for the Main Chassis Schematic is 580665 and is included in this supplement.

1.1 SPECIFICATIONS

The Specifications for the WJ-8610A-5 Receiver Controller remain identical to those of the WJ-8610A-1 Controller. The Table of Specifications in the WJ-8610A-1 should be used for the WJ-8610A-5.

1.2 CONNECTORS

The connectors used on the WJ-8610A-5 are identical to those used on the WJ-8610A-1, except that on the rear panel, two connectors have been moved and two others added. Those moved are J5 and J6 and those added are J15, Tape Date In and J16, Tape Audio In. The location of these jacks are shown in **Figure 1-1**.

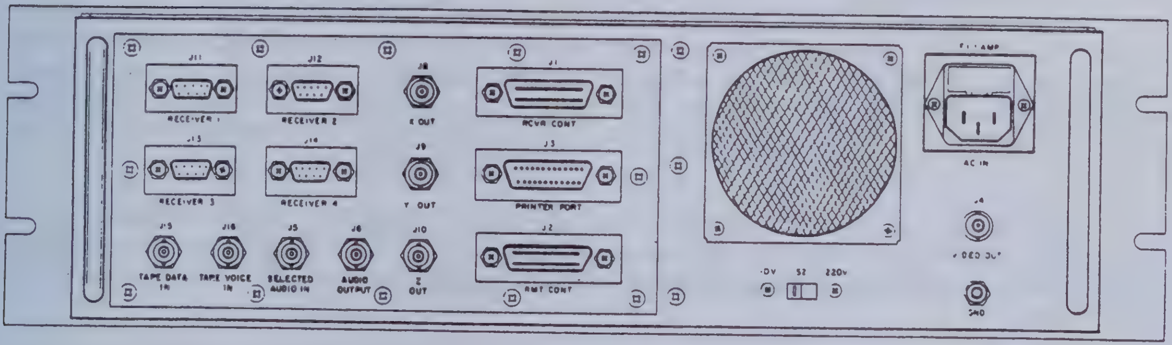

J11
RECEIVER 1
J12
RECEIVER 2
J8
X OUT
J1
RCVR CONT
J13
RECEIVER 3
J14
RECEIVER 4
J9
Y OUT
J3
PRINTER PORT
J15
TAPE DATA IN
J16
TAPE VOICE IN
J5
SELECTED AUDIO IN
J6
AUDIO OUTPUT
J10
Z OUT
J2
RMT CONT
AMP
AC IN
J4
VIDEO OUT
S2
220V
GND

Figure 1-1. WJ-8610A-5 Rear Panel

1.3 CONTROLS AND INDICATORS

There are no changes in controls or indicators in the WJ-8610A-5 Controller. However, there are additional CRT Displays, one which is modified and a number of new Soft Keys have been added to provide for the addition of tape recording.

1.3.1 CONTROLLER PARAMETER SELECTION DISPLAY

This display has been modified to provide additional data. The display now contains the following additional data in the display:

REMOTE ADR:	Remote Address (Previously was ADR:)
RCVR BUS TIMEOUT:	Timeout Bus After:* - Range is 0.2 sec to 4.2 sec
DATE:	Current Date*
TIME:	Real Time* - Format HH:MM
PRINT LOG AFTER:	0-400 lines or up to 99.59 minutes *(1)

PRINTER PORT CONFIGURATION

BAUD:	Set To Printer Baud Rate - range is 600 to 19,200 baud*
BITS:	May be set to 7 or 8 bits*
PARITY:	May be set to: EVEN, OFF, or NONE*
COLUMNS:	40 or 80*

SYSTEM STATUS

LAST DOWN:	Last Date System was down and time down
UP:	Date returned to service
RCVR BUS SRQ SERVICE IS:	Choice is ON or OFF

(1) The Controller will tell the printer to print the log according to the "PRINT AFTER" setting parameter, depending on which occurs first. For example, if the "Print After Lines" is set to 100 lines, and the "Print After Time" is set to 01:00 (one hour and zero minutes), the log will be printed after EITHER the number of lines reach 100 lines, OR 1 hour and zero minutes of time has elapsed since the last time the log was printed. When the log is printed, the number of lines will be reset to 0 and the time will be reset to 0, starting the operation over again.

Note that the new parameters of the Controller Parameter Selection Display which can be modified are marked with * in the above list. They are changed using the same methods as used in other parameter changes listed in the WJ-8610A-1 Instruction Manual using the "EDIT" function.

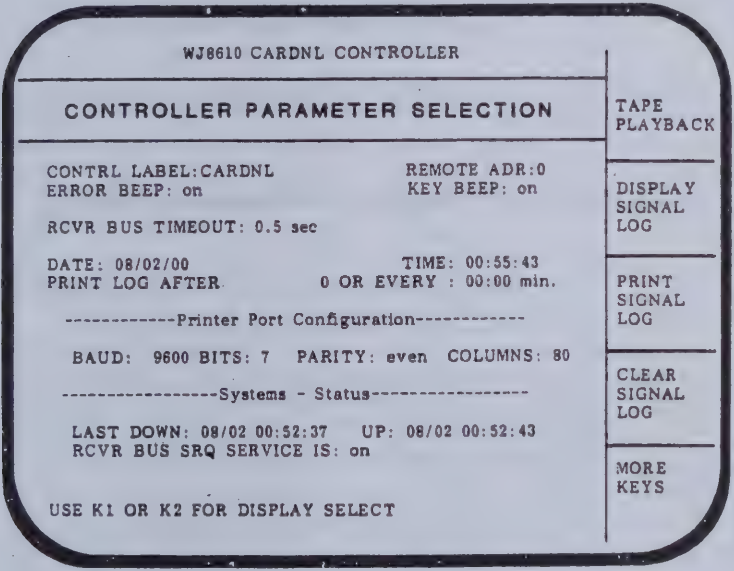
Figure 1-2 illustrates the new Controller Parameter Selection Display as used in the WJ-8610A-5.

NOTE

Any instructions related to the next available function are displayed on the bottom line of the CRT in reverse video, in the same manner as other WJ-8610A dsplays.

1.3.2 THIRD PAGE SOFT KEY MENU

The WJ-8610A Controller has an additional page of the Soft Key Menu. The WJ-8610A-1 has only two pages at this level. The second page was reached by pressing "MORE KEYS". In the same way, the third page of the Soft Keys Menu is reached by pressing "MORE KEYS" an additional time. (If "MORE KEYS" is pressed again, the menu will return to the first page.) The new page of Soft Key Menu may be reached at any First Level Display. The new Soft Key Menu will appear as shown in **Figure 1-2**, where it is shown with the Controller Parameter Selection Display. The Soft Key choices and what they do are detailed in **Table 1-1**.

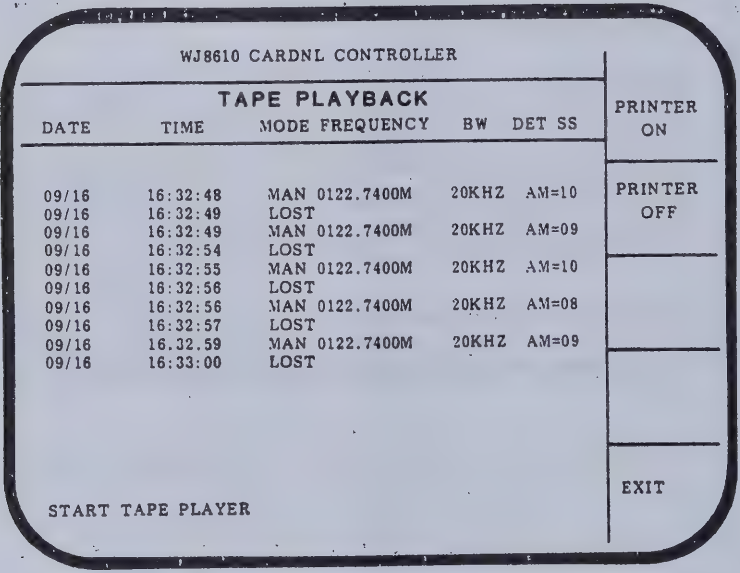


```
              WJ8610 CARDNL CONTROLLER

      CONTROLLER PARAMETER SELECTION               TAPE
                                                   PLAYBACK
 CONTRL LABEL:CARDNL              REMOTE ADR:0
 ERROR BEEP: on                   KEY BEEP: on     DISPLAY
                                                   SIGNAL
 RCVR BUS TIMEOUT: 0.5 sec                         LOG

 DATE: 08/02/00                   TIME: 00:55:43   PRINT
 PRINT LOG AFTER          0 OR EVERY : 00:00 min.  SIGNAL
                                                   LOG
   ------------Printer Port Configuration------------

   BAUD:  9600 BITS: 7  PARITY: even  COLUMNS: 80  CLEAR
                                                   SIGNAL
   -----------------Systems - Status-----------------  LOG

   LAST DOWN: 08/02 00:52:37   UP: 08/02 00:52:43   MORE
   RCVR BUS SRQ SERVICE IS: on                     KEYS

 USE K1 OR K2 FOR DISPLAY SELECT
```

Figure 1-2. WJ-8610A-5 Controller Parameter Selection Display

Table 1-1. Third Page Soft Key Menu

Softkey	Name	Description
K1	TAPE PLAYBACK	Pressing this soft key will select the Tape Playback Operational Display Screen and also present another Soft Key Menu. (See **Table 1-4** and **Figure 1-5.**)
K2	DISPLAY SIGNAL LOG	Pressing this Soft Key will select the Signal Log Operating Display Screen and also makes an additional Soft Key Menu available. (See **Table 1-3** and **Figure 1-5.**)
K3	PRINT SIGNAL LOG	If a printer is connected and configured properly, pressing this soft key will cause the Signal Log to immediately be printed.
K4	CLEAR SIGNAL LOG	Pressing this soft key will immediately clear the Signal Log and erase it from Controller Memory. Note: There is **no** second chance!
K5	MORE KEYS	Pressing this soft key causes the Soft Key Menu to return to the first soft key page.



```
              WJ8610 CARDNL CONTROLLER

                  TAPE PLAYBACK
DATE        TIME       MODE FREQUENCY     BW     DET SS

09/16       16:32:48   MAN  0122.7400M    20KHZ  AM=10
09/16       16:32:49   LOST
09/16       16:32:49   MAN  0122.7400M    20KHZ  AM=09
09/16       16:32:54   LOST
09/16       16:32:55   MAN  0122.7400M    20KHZ  AM=10
09/16       16:32:56   LOST
09/16       16:32:56   MAN  0122.7400M    20KHZ  AM=08
09/16       16:32:57   LOST
09/16       16.32.59   MAN  0122.7400M    20KHZ  AM=09
09/16       16:33:00   LOST



START TAPE PLAYER
```

Figure 1-3. Tape Playback Operational Display Mode

1.3.3 TAPE PLAYBACK OPERATIONAL DISPLAY

The Playback Operational mode is selected by pressing the "TAPE PLAYBACK" soft key, available on the third page of the Soft Key Menu as previously described. This mode produces the Tape Playback Display shown in Figure 1-3. The items which are detailed in the display are described in **Table 1-2.** The items all appear on a single line. However, when the signal is lost, a second line is added which gives the date and time the signal was lost, followed by "LOST".

Table 1-2. Tape Playback Operational Mode Display

Item	Explanation
DATE	Date signal was recorded (MM/DD)
TIME	Time signal was recorded (24 hour format)
MODE	Receiver mode (MAN, SCAN, etc)
FREQUENCY	In MHz (XXX.XXXX)
BW	Bandwidth being used; in KHz or MHz
DET	Type of detection used (AM, FM, etc)
SS	Signal strength (-XXX)

While in the Tape Playback mode, two new soft keys appear at K1 and K2. K1 is now "PRINTER ON" and when pressed starts printing off the Tape Log according the the Printer Port Configuration part of the Controller Parameter Selection Display. K2 is "PRINTER OFF". When pressed the printer is deactivated.

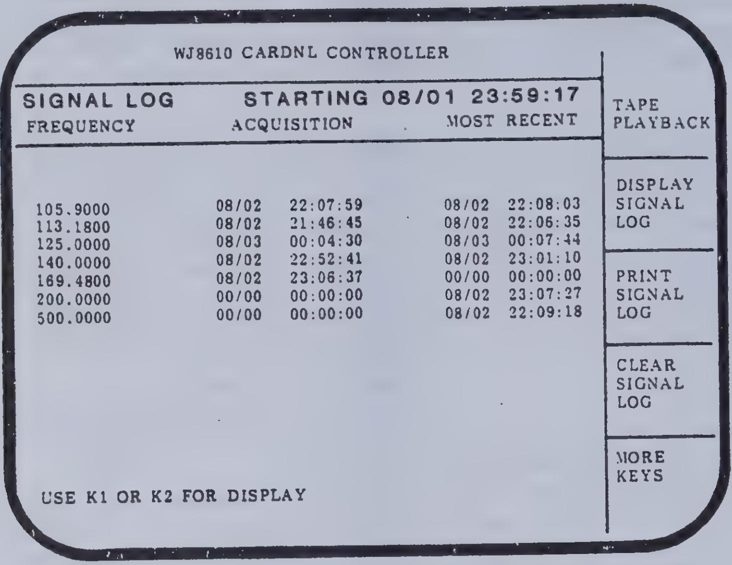
A prompt will appear at the bottom of the CRT display in reverse video reminding the operator to "START TAPE PLAYER". When the player is started and the first burst of data is received, the prompt will disappear. When the printer is started with softkey K1, the prompt "PRINT ENABLED: USE K1 FOR LINE FEED" will appear. Each time K1 is pressed, the printer will line feed one line.

1.3.4 SIGNAL LOG OPERATIONAL MODE DISPLAY

When the "DISPLAY SIGNAL LOG" soft key on page 3 of the Soft Key Menu is pressed (**Figure 1-2**), the Signal Log is displayed. The display is illustrated in **Figure 1-4**. The Soft Key Menu will remain as it was when the Signal Log Display was selected, though an additional level is available with this display (which will be described shortly) and the Signal Log being displayed may be printed by pressing the "PRINT SIGNAL LOG" softkey, K3. Note that printing the log does NOT remove it from memory or the screen. However, when K4 Soft Key, "CLEAR SIGNAL LOG" is pressed, the screen is cleared but also note that SO IS THE MEMORY! There is no way of changing your mind after the button is pressed. Pressing K4 PERMANENTLY clears the screen AND memory.

The Signal Log will display the starting date (MM/DD) and starting time (in 24 hour format, HH:MM:SS) at the top of the display, as shown in Figure 1-4. In addition it will display several different pieces of information about each of the signals on the Signal Log. One of these is "FREQUENCY". The frequency of the signal log will be displayed in MHz, in the format (i.e.), 105.9000 for the frequency of 105.9 MHz.

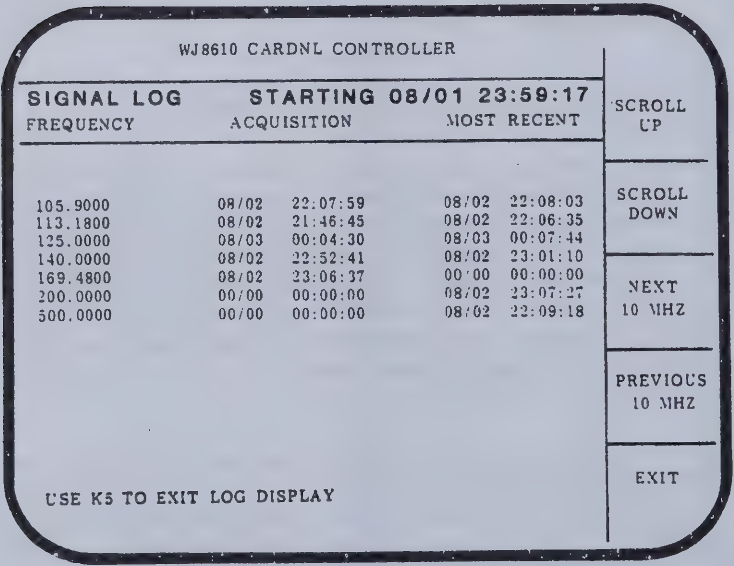
Acquisition is also given. The format used in the display is MM/DD for date and HH:MM:SS for time. The most recent acquisition is also given in the same format. Each signal will be displayed in this log, in an ascending Frequency order.



```
                 WJ8610 CARDNL CONTROLLER
SIGNAL LOG            STARTING 08/01 23:59:17
FREQUENCY           ACQUISITION          MOST RECENT

105.9000         08/02   22:07:59      08/02   22:08:03
113.1800         08/02   21:46:45      08/02   22:06:35
125.0000         08/03   00:04:30      08/03   00:07:44
140.0000         08/02   22:52:41      08/02   23:01:10
169.4800         08/02   23:06:37      00/00   00:00:00
200.0000         00/00   00:00:00      08/02   23:07:27
500.0000         00/00   00:00:00      08/02   22:09:18

USE K1 OR K2 FOR DISPLAY
```

TAPE PLAYBACK
DISPLAY SIGNAL LOG
PRINT SIGNAL LOG
CLEAR SIGNAL LOG
MORE KEYS

Figure 1-4. Signal Log Operational Mode Display



```
                 WJ8610 CARDNL CONTROLLER
SIGNAL LOG            STARTING 08/01 23:59:17
FREQUENCY           ACQUISITION          MOST RECENT

105.9000         08/02   22:07:59      08/02   22:08:03
113.1800         08/02   21:46:45      08/02   22:06:35
125.0000         08/03   00:04:30      08/03   00:07:44
140.0000         08/02   22:52:41      08/02   23:01:10
169.4800         08/02   23:06:37      00/00   00:00:00
200.0000         00/00   00:00:00      08/02   23:07:27
500.0000         00/00   00:00:00      08/02   22:09:18

USE K5 TO EXIT LOG DISPLAY
```

SCROLL UP
SCROLL DOWN
NEXT 10 MHZ
PREVIOUS 10 MHZ
EXIT

Figure 1-5. Signal Log Operational Mode with 2nd Level Soft Keys

When the "DISPLAY SIGNAL LOG" soft key is pressed a second time, a new level of soft keys appear which are used with the Display Signal Log operational mode. The new soft keys are illustrated in **Figure 1-5** and described in **Table 1-3.**

1.4 OPERATION

Operation of the WJ-8610A-5 Receiver Controller is identical with that of the WJ-8610A-1 except for the Tape Recorder operation which has been discussed in **section 1.3** of this Supplement. The Instruction manual for the WJ-8610A-1 Controller should be used for all other operations of the Controller.

Table 1-3. Second Level Soft Keys of Signal Log Operational Mode

Soft Key	Name	Description
K1	SCROLL UP	When pressed causes the Signal Log to scroll up one line, (moving the reading "window" down one line).
K2	SCROLL DOWN	When pressed causes the Signal Log to scroll down one line, (moving the reading "window" up one line).
K3	NEXT 10 MHz	When pressed causes the next 10 MHz of of spectrum to be displayed. (Moves the reading "window" down the log).
K4	PREVIOUS 10 MHz	When pressed causes the previous 10 MHz the spectrum to be displayed. (Moves the reading "window" up the log.)
K5	EXIT	When pressed causes the operator to exit the Second Level of Operational Mode.

1.5 MODIFIED/ADDED MODULES

The Rear Panel is modified to accept two additional connectors and an additional module has been added. The changes are detailed in **Table 1-4.**

Table 1-4. Modified/Added Modules and Schematic Numbers

Module	Added/Modified	Old Schematic No.	New Schematic No.
Rear Panel	Modified	480399	580665
Serial I/O and Audio Type 796681-2	Added	None	580700

1.6 PARTS LIST

A parts list is included in this Supplement for the Main Chassis and a parts list is also included for the Serial I/O And Audio Assembly, Type 796681-2 which has been added.

1.7 SCHEMATICS

A schematic for the Main Chassis Drawing of the WJ-8610A-5, schematic number 580665, is included in this supplement (3 sheets). The Schematic Drawing for the Serial I/O And Audio Assembly (A4A10), Type No. 796681-2, schematic number 580700, (2 sheets) is also included.

1.6 TYPE WJ-8610A-5 CONTROLLER

REF DESIG PREFIX **MAIN CHASSIS**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A4A10	Serial I/O and Audio Assembly	1	796681-2	14632	
FL4	Filter/EMI/RFI	4	1240-030-0000	72982	
FL9	Same as FL4				
FL10	Same as FL4				
J15	Part of FL9				
J16	Part of FL10				

1.6.1 TYPE 796681-X SERIAL I/O AND AUDIO REF DESIG PREFIX **A4A10**

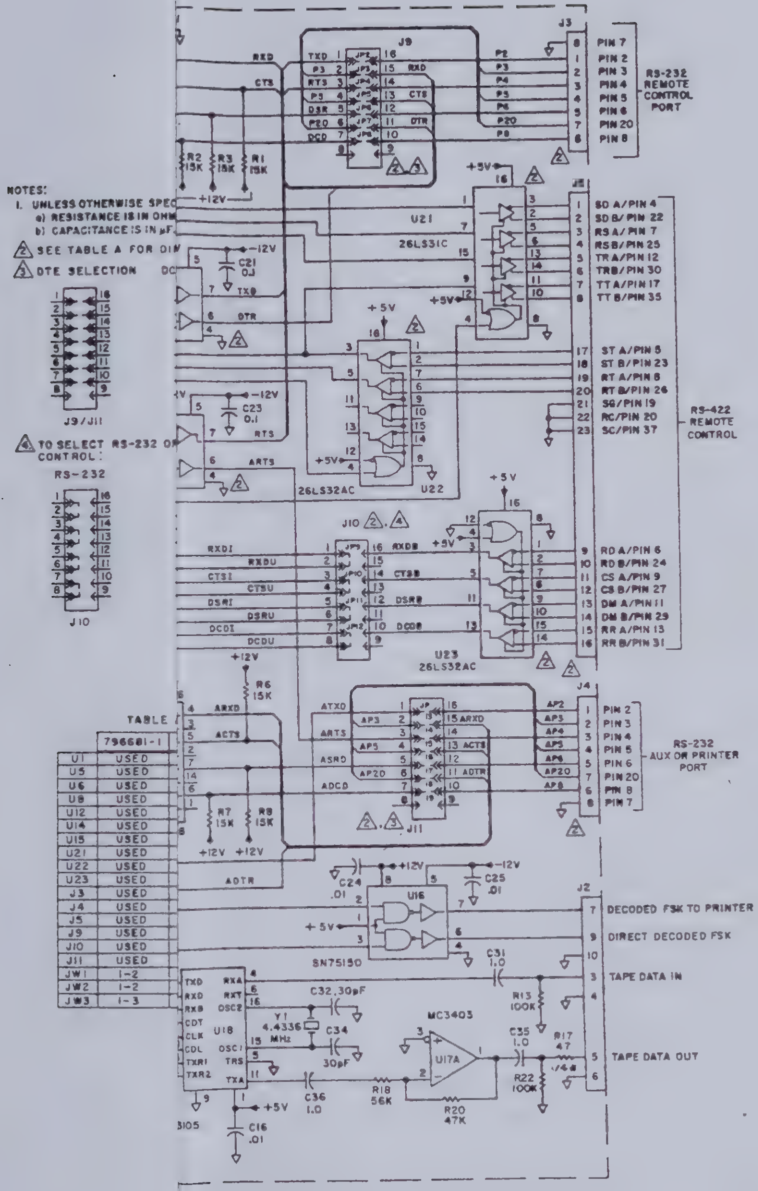
REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Monolithic: 18 pf, ±2%, 100 V	2	100-100-NPO-180G	51642	
C2	Same as C1				
C3	Capacitor, Ceramic, Tantalum: 27 µF, 10%, 35 V	3	196D276X9035TE4	56289	
C5 Thru C10	Same as C4				
C11	Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V	15	34453-1	14632	
C12 Thru C17	Same as C11				
C18	Same as C3				
C19	Same as C3				
C20 Thru C23	Same as C4				
C24 Thru C30	Same as C11				
C31	Capacitor, Ceramic, Disc: 1 µF, 20%, 50 V	7	8131-050-651-105M	59660	
C32	Capacitor, Ceramic, Monolithic: 30 pF, ±2%, 100 V	2	150-100-NPO-300G	51642	
C33	Same as C11				
C34	Same as C32				
C35 Thru C40	Same as C31				
J1	Connector, Modified	1	180606-1	14632	
J2	Connector, Modified	1	180606-2	14632	
J3 Thru J5	Not Used				
J6	Connector, Receptacle, Multiple	1	65626-102	22526	
J7	Connector, Modified	1	180608-1	14632	
J8	Connector, Receptacle	1	65610-116	22526	
R1	Resistor, Fixed, Film: 15 kΩ, 5%, 1/8 W	8	CF1/8-15K/J	09021	
R2	Same as R1				
R3	Same as R1				
R4	Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W	5	CF1/8-22K/J	09021	
R5	Same as R4				
R6 Thru R9	Same as R1				
R10	Resistor, Fixed, Film: 100Ω, 5%, 1/4 W	1	CF1/4-100 OHMS/J	09021	
R11	Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W	3	CF1/8-47K/J	09021	
R12	Resistor, Fixed, Film: 56 kΩ, 5%, 1/8 W	3	CF1/8-56K/J	09021	
R13	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	3	CF1/8-100K/J	09021	
R14	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	2	CF1/8-10K/J	09021	

REF DESIG PREFIX **A4A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R15	Same as R12				
R16	Resistor, Fixed, Film: 68 kΩ, 5%, 1/8 W	1	CF1/8-68K/J	09021	
R17	Resistor, Fixed, Film: 47Ω, 5%, 1/4 W	1	CF1/4-47 OHMS/J	09021	
R18	Same as R12				
R19	Resistor, Fixed, Film: 33kΩ, 5%, 1/8 W	1	CF1/8-33K/J	09021	
R20	Same as R11				
R21	Resistors, Trimmer, Film: 10 kΩ, 10%, 1/2 W	2	62P9R10K	73138	
R22	Same as R13				
R23	Resistor, Fixed, Film: 510Ω, 5%, 1/4 W	1	CF1/4-510 OHMS/J	09021	
R24	Same as R21				
R25	Same as R14				
R26	Same as R13				
R27	Same as R11				
R28	Same as R1				
R29	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	1	CF1/8-4.7K/J	09021	
R30	Same as R4				
R31	Same as R4				
R32	Same as R4				
R33	Resistor, Fixed, Film: 1.0M, 5%, 1/8 W	3	CF1/8-1M/J	09021	
R34	Same as R33				
R35	Same as R33				
U1	Not Used				
U2	Integrated Circuit, BUF	2	MM74HCT04N	27014	
U3	Integrated Circuit, DC	2	MM74HCT138N	27014	
U4	Same as U3				
U5	Not Used				
U6	Not Used				
U7	Integrated Circuit	1	SN74LS38N	01295	
U8	Not Used				
U9	Integrated Circuit	1	MM74HC32N	27014	
U10	Integrated Circuit	1	MM74HC273N	27014	
U11	Integrated Circuit	1	MM74HC373N	27014	
U12	Not used				
U13	Integrated Circuit	1	ICM72091PA	32293	
U14	Not Used				
U15	Not Used				
U16	Integrated Circuit	1	SN75150P	01295	
U17	Integrated Circuit	1	MC3403P	04713	
U18	Integrated Circuit	1	TCM3105JL	01295	
U19	Integrated Circuit	1	SCN2661BC1N28	18324	
U20	Integrated Circuit	1	DG301CJ	17856	
U21	Not Used				

REF DESIG PREFIX **A4A10**

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U22	Not Used				
U23	Not Used				
U24	Same as U2				
Y1	Crystal, Quartz	1	91805-65	14632	
Y2	Crystal, Quartz	1	MP042	75378	


NOTES:
1. UNLESS OTHERWISE SPEC
a) RESISTANCE IS IN OHM
b) CAPACITANCE IS IN µF.
2 SEE TABLE A FOR DI
3 DTE SELECTION
J9/J11
4 TO SELECT RS-232 O
CONTROL:
RS-232
J10
J9
J3
RS-232 REMOTE CONTROL PORT
U21
26LS31C
U22
26LS32AC
J5
RS-422 REMOTE CONTROL
J10
U23
26LS32AC
J4
RS-232 AUX OR PRINTER PORT
J11
U16
SN75150
J2
DECODED FSK TO PRINTER
DIRECT DECODED FSK
TAPE DATA IN
TAPE DATA OUT
U18
MC3403
U17A
Y1 4.4336 MHz
TABLE

	796681-1
U1	USED
U5	USED
U6	USED
U8	USED
U12	USED
U14	USED
U15	USED
U21	USED
U22	USED
U23	USED
J3	USED
J4	USED
J5	USED
J9	USED
J10	USED
J11	USED
JW1	1-2
JW2	1-2
JW3	1-3

-6. Type 796681-X, Serial I/O & Audio (A4A10), Schematic Diagram 580700 (03)

REF DESIG PREFIX **A4A10**

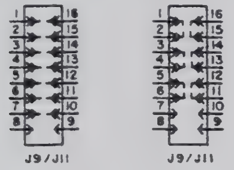
REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U22	Not Used				
U23	Not Used				
U24	Same as U2				
Y1	Crystal, Quartz	1	91805-65	14632	
Y2	Crystal, Quartz	1	MP042	75378	

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN μF.

(2) SEE TABLE A FOR DIFFERENCE IN TYPES.

(3) DTE SELECTION   DCE SELECTION


1
2
3
4
5
6
7
8
16
15
14
13
12
11
10
9
J9/J11
J9/J11

(4) TO SELECT RS-232 OR RS-422 REMOTE CONTROL:

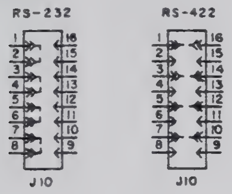

RS-232
RS-422
1
2
3
4
5
6
7
8
16
15
14
13
12
11
10
9
J10
J10

TABLE A

	796681-1	796681-2
U1	USED	N/U
U5	USED	N/U
U6	USED	N/U
U8	USED	N/U
U12	USED	N/U
U14	USED	N/U
U15	USED	N/U
U21	USED	N/U
U22	USED	N/U
U23	USED	N/U
J3	USED	N/U
J4	USED	N/U
J5	USED	N/U
J9	USED	N/U
J10	USED	N/U
J11	USED	N/U
JW1	1-2	1-2
JW2	1-2	1-2
JW3	1-3	1-3

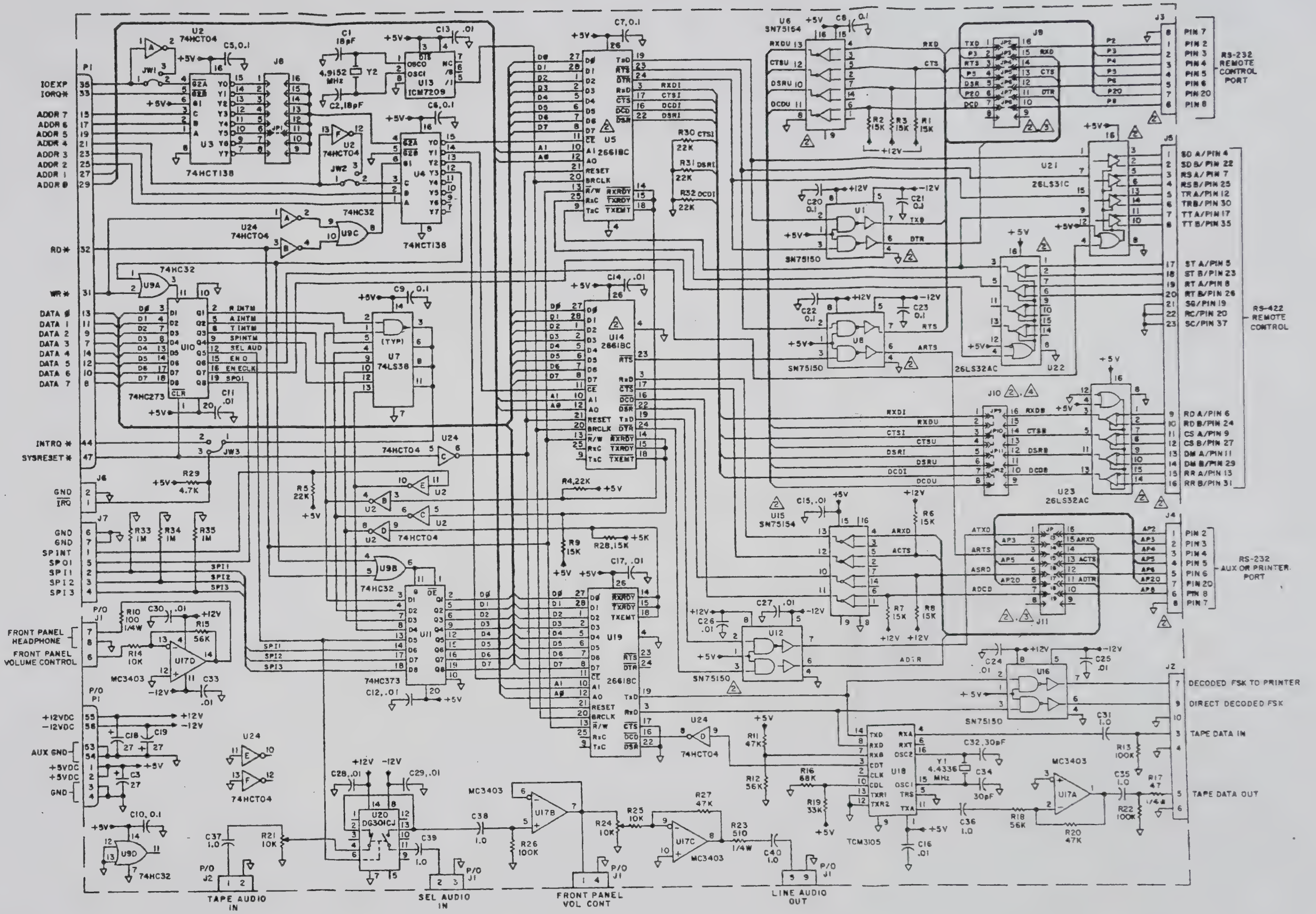
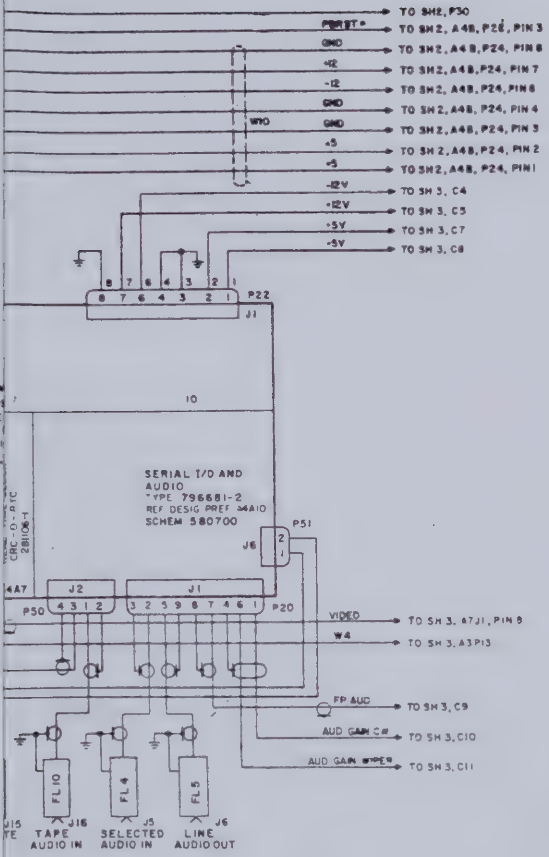

P1
IOEXP
IORQ*
ADDR 7
ADDR 6
ADDR 5
ADDR 4
ADDR 3
ADDR 2
ADDR 1
ADDR 0
RD*
WR*
DATA 0
DATA 1
DATA 2
DATA 3
DATA 4
DATA 5
DATA 6
DATA 7
INTRQ*
SYSRESET*
GND
IRQ
GND
GND
SPINT
SPO1
SPI1
SPI2
SPI3
FRONT PANEL HEADPHONE
FRONT PANEL VOLUME CONTROL
+12VDC
-12VDC
AUX GND
+5VDC
+5VDC
GND
U3 74HCT138
U2 74HCT04
J8
C1 18pF
4.9152 MHz
Y2
C2,18pF
U13 ICM7209
U4 74HCT138
U24 74HCT04
U9C
U9A 74HC32
U10 74HC273
U7 74LS38
U9B
U11 74HC373
U17D MC3403
U9D 74HC32
U20 DG304CJ
U17B MC3403
U17C MC3403
U5 2681C
U14 2681C
U19 2681C
U6 SN75154
U1 SN75150
U8 SN75150
U12 SN75150
U15 SN75154
U16 SN75150
U21 26LS31C
U22 26LS32AC
U23 26LS32AC
U18 TCM3105
Y1 4.4336 MHz
U17A MC3403
J3
J5
J4
J2
J9
J10
J11
RS-232 REMOTE CONTROL PORT
RS-422 REMOTE CONTROL
RS-232 AUX OR PRINTER PORT
DECODED FSK TO PRINTER
DIRECT DECODED FSK
TAPE DATA IN
TAPE DATA OUT
TAPE AUDIO IN
SEL AUDIO IN
FRONT PANEL VOL CONT
LINE AUDIO OUT

Figure 1-6. Type 796681-X, Serial I/O & Audio (A4A10), Schematic Diagram 580700 (03)

NOTES:
1. UNLESS OTHERW
a) RESISTANCE I
b) CAPACITANCE
2 SHIELDED TWO
ARE TO BE TWI
3. SLOTS A4A-8,


TO SH2, P30
PRESET*
TO SH 2, A4B, P26, PIN 3
GND
TO SH 2, A4B, P24, PIN 8
+12
TO SH 2, A4B, P24, PIN 7
-12
TO SH 2, A4B, P24, PIN 6
GND
TO SH 2, A4B, P24, PIN 4
W10
GND
TO SH 2, A4B, P24, PIN 3
+5
TO SH 2, A4B, P24, PIN 2
+5
TO SH 2, A4B, P24, PIN 1
-12V
TO SH 3, C4
+12V
TO SH 3, C5
+5V
TO SH 3, C7
-5V
TO SH 3, C8
8 7 6 4 3 2 1
P22
J1
10
SERIAL I/O AND
AUDIO
TYPE 796681-2
REF DESIG PREF A4A10
SCHEM 580700
CRC-O-RTC
281106-1
P51
J6
2 1
4A7
J2
J1
4 3 1 2
3 2 5 9 8 7 4 6 1
P50
P20
VIDEO
TO SH 3, A7J1, PIN 8
W4
TO SH 3, A3P13
FP AUD
TO SH 3, C9
AUD GAIN CW
TO SH 3, C10
AUD GAIN WIPER
TO SH 3, C11
FL10
FL4
FL5
J15
TE
J16
TAPE
AUDIO IN
J5
SELECTED
AUDIO IN
J6
LINE
AUDIO OUT

7. Type WJ-8610A-5, Controller Main Chassis Schematic Diagram 580665 (Sheet 1 of 3) (02)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS IN μF.
2. SHIELDED TWO OR THREE CONDUCTOR WIRES ARE TO BE TWISTED
3. SLOTS A4A-8, A4A-9 ARE NOT USED.

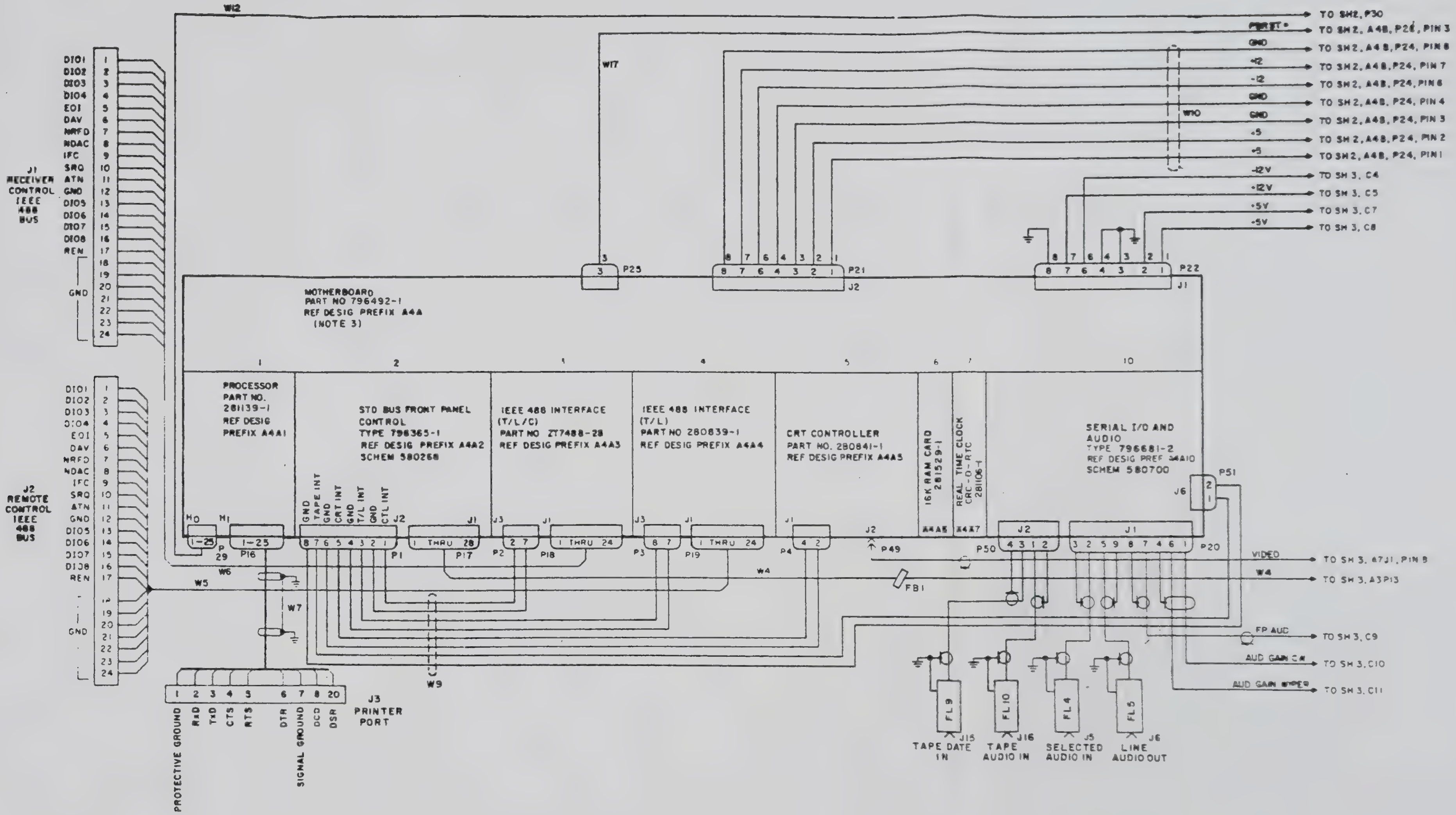
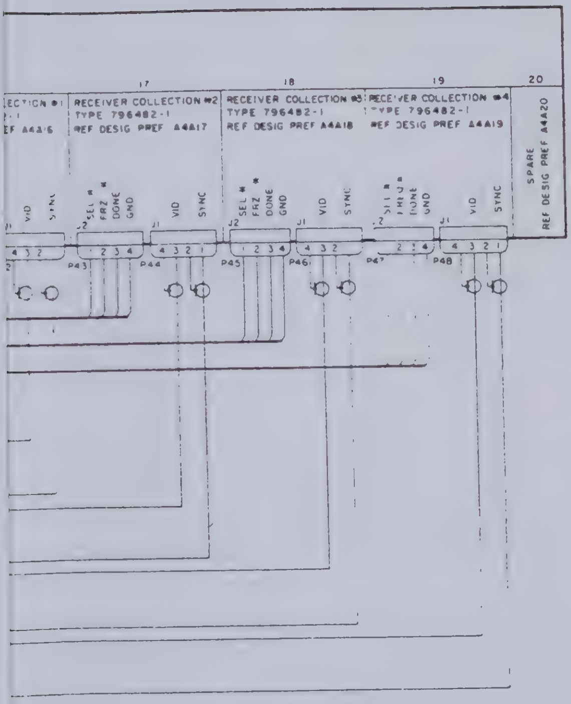

W12
W17
W10
TO SH2, P30
RESET*
TO SH2, A4B, P26, PIN 3
GND
TO SH2, A4B, P24, PIN 8
+12
TO SH2, A4B, P24, PIN 7
-12
TO SH2, A4B, P24, PIN 6
GND
TO SH2, A4B, P24, PIN 4
GND
TO SH2, A4B, P24, PIN 3
+5
TO SH2, A4B, P24, PIN 2
+5
TO SH2, A4B, P24, PIN 1
-12V
TO SH 3, C4
+12V
TO SH 3, C5
+5V
TO SH 3, C7
-5V
TO SH 3, C8
J1
RECEIVER
CONTROL
IEEE
488
BUS
DIO1
DIO2
DIO3
DIO4
EOI
DAV
NRFD
NDAC
IFC
SRQ
ATN
GND
DIO5
DIO6
DIO7
DIO8
REN
GND
J2
REMOTE
CONTROL
IEEE
488
BUS
P25
P21
J2
P22
J1
MOTHERBOARD
PART NO 796492-1
REF DESIG PREFIX A4A
(NOTE 3)
1
2
3
4
5
6
7
10
PROCESSOR
PART NO.
281139-1
REF DESIG
PREFIX A4A1
STD BUS FRONT PANEL
CONTROL
TYPE 796365-1
REF DESIG PREFIX A4A2
SCHEM 580268
IEEE 488 INTERFACE
(T/L/C)
PART NO ZT7488-28
REF DESIG PREFIX A4A3
IEEE 488 INTERFACE
(T/L)
PART NO 280839-1
REF DESIG PREFIX A4A4
CRT CONTROLLER
PART NO. 280841-1
REF DESIG PREFIX A4A5
16K RAM CARD
281529-1
A4A6
REAL TIME CLOCK
CRC-O-RTC
281106-1
A4A7
SERIAL I/O AND
AUDIO
TYPE 796681-2
REF DESIG PREF A4A10
SCHEM 580700
GND
TAPE INT
GND
CRT INT
GND
T/L INT
GND
CTL INT
H0
H1
1-25
P29
P16
J2
J1
1 THRU 28
P1
P17
J3
J1
P2
P18
1 THRU 24
J3
J1
P3
P19
1 THRU 24
J1
P4
J2
P49
P50
J2
J1
P20
P51
J6
W6
W5
W7
W9
W4
FB1
VIDEO
TO SH 3, A7J1, PIN 8
TO SH 3, A3P13
FP AUC
TO SH 3, C9
AUD GAIN CW
TO SH 3, C10
AUD GAIN WIPER
TO SH 3, C11
FL9
FL10
FL4
FL5
J15
TAPE DATE IN
J16
TAPE AUDIO IN
J5
SELECTED AUDIO IN
J6
LINE AUDIO OUT
J3
PRINTER
PORT
PROTECTIVE GROUND
RxD
TxD
CTS
RTS
DTR
SIGNAL GROUND
DCD
DSR

Figure 1-7. Type WJ-8610A-5, Controller Main Chassis Schematic Diagram 580665 (Sheet 1 of 3) (02)


17
18
19
20
ECTION #1
EF A4A16
RECEIVER COLLECTION #2
TYPE 796482-1
REF DESIG PREF A4A17
RECEIVER COLLECTION #3
TYPE 796482-1
REF DESIG PREF A4A18
RECEIVER COLLECTION #4
TYPE 796482-1
REF DESIG PREF A4A19
SPARE
REF DESIG PREF A4A20
VID
SYNC
SEL *
FRZ *
DONE
GND
J1
J2
P43
P44
P45
P46
P47
P48

Type WJ-8610A-5, Controller Main Chassis
Schematic Diagram 580665 (Sheet 2 of 2) (02)

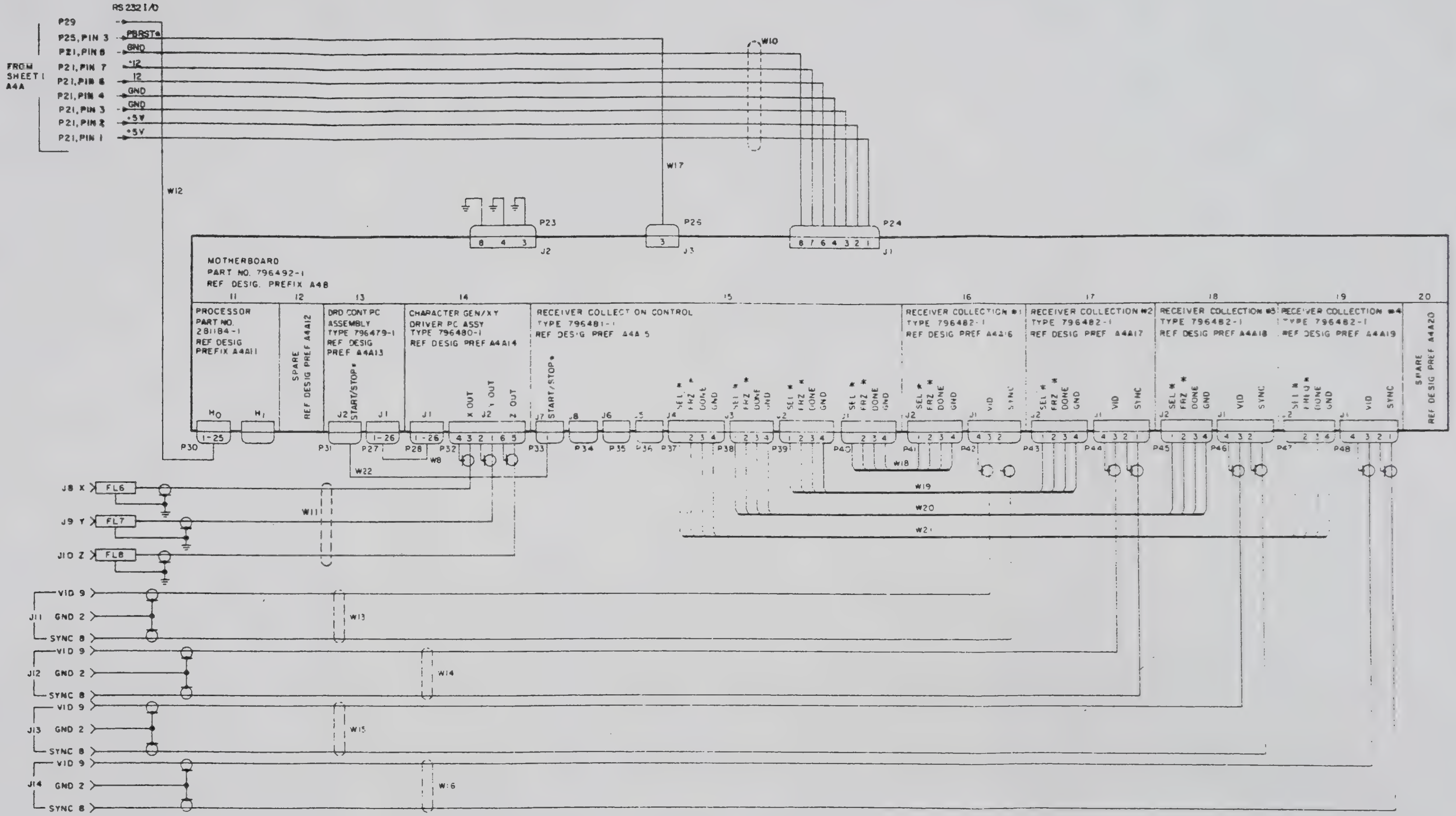
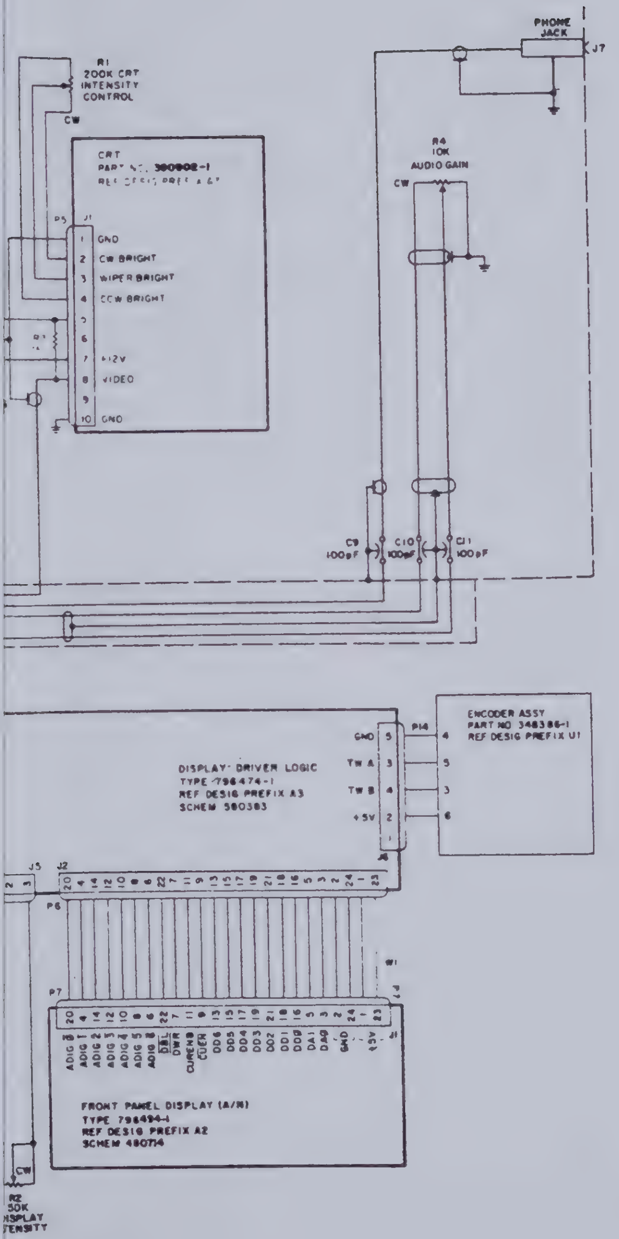

RS 232 I/O
P29
P25, PIN 3
P21, PIN 8
P21, PIN 7
P21, PIN 6
P21, PIN 4
P21, PIN 3
P21, PIN 2
P21, PIN 1
FROM SHEET 1 A4A
PBRST*
GND
+12
12
GND
GND
+5V
+5V
W10
W12
W17
P23
P25
P24
J2
J3
J1
MOTHERBOARD
PART NO. 796492-1
REF DESIG. PREFIX A4B
11
12
13
14
15
16
17
18
19
20
PROCESSOR
PART NO.
281184-1
REF DESIG
PREFIX A4A11
SPARE
REF DESIG PREF A4A12
DRD CONT PC ASSEMBLY
TYPE 796479-1
REF DESIG
PREF A4A13
START/STOP*
CHARACTER GEN/XY DRIVER PC ASSY
TYPE 796480-1
REF DESIG PREF A4A14
X OUT
Y OUT
Z OUT
RECEIVER COLLECTION CONTROL
TYPE 796481-1
REF DESIG PREF A4A15
RECEIVER COLLECTION #1
TYPE 796482-1
REF DESIG PREF A4A16
RECEIVER COLLECTION #2
TYPE 796482-1
REF DESIG PREF A4A17
RECEIVER COLLECTION #3
TYPE 796482-1
REF DESIG PREF A4A18
RECEIVER COLLECTION #4
TYPE 796482-1
REF DESIG PREF A4A19
SPARE
REF DESIG PREF A4A20
SEL*
FRZ*
DONE
GND
VID
SYNC
H0
H1
1-25
1-26
P30
P31
P27
P28
P32
P33
P34
P35
P36
P37
P38
P39
P40
P41
P42
P43
P44
P45
P46
P47
P48
W8
W18
W19
W20
W21
W22
J8 X
J9 Y
J10 Z
FL6
FL7
FL8
W11
J11
J12
J13
J14
VID 9
GND 2
SYNC 8
W13
W14
W15
W16

Figure 1-7. Type WJ-8610A-5, Controller Main Chassis Schematic Diagram 580665 (Sheet 2 of 2) (02)


PHONE JACK
J7
R1
200K CRT
INTENSITY
CONTROL
CW
CRT
PART NO. 380802-1
REF DESIG PREFIX A6
P5
J1
1 GND
2 CW BRIGHT
3 WIPER BRIGHT
4 CCW BRIGHT
5
6
7 +12V
8 VIDEO
9
10 GND
R4
10K
AUDIO GAIN
CW
C9
100pF
C10
100pF
C11
100pF
ENCODER ASSY
PART NO 348386-1
REF DESIG PREFIX U1
P14
GND 5 4
TW A 3 5
TW B 4 3
+5V 2 6
DISPLAY DRIVER LOGIC
TYPE 798474-1
REF DESIG PREFIX A3
SCHEM 580383
J4
J3
J2
P6
W1
P7
J1
ADIG 8
ADIG 1
ADIG 2
ADIG 3
ADIG 4
ADIG 5
ADIG 6
DBL
DWR
CURENB
CUEN
DD6
DD5
DD4
DD3
DD2
DD1
DD0
DA1
DA0
GND
+5V
FRONT PANEL DISPLAY (A/N)
TYPE 798494-1
REF DESIG PREFIX A2
SCHEM 480714
CW
R2
50K
DISPLAY
INTENSITY

-7. Type WJ-8610A-5, Controller Main Chassis Schematic Diagram 580665 (Sheet 3 of 3) (02)

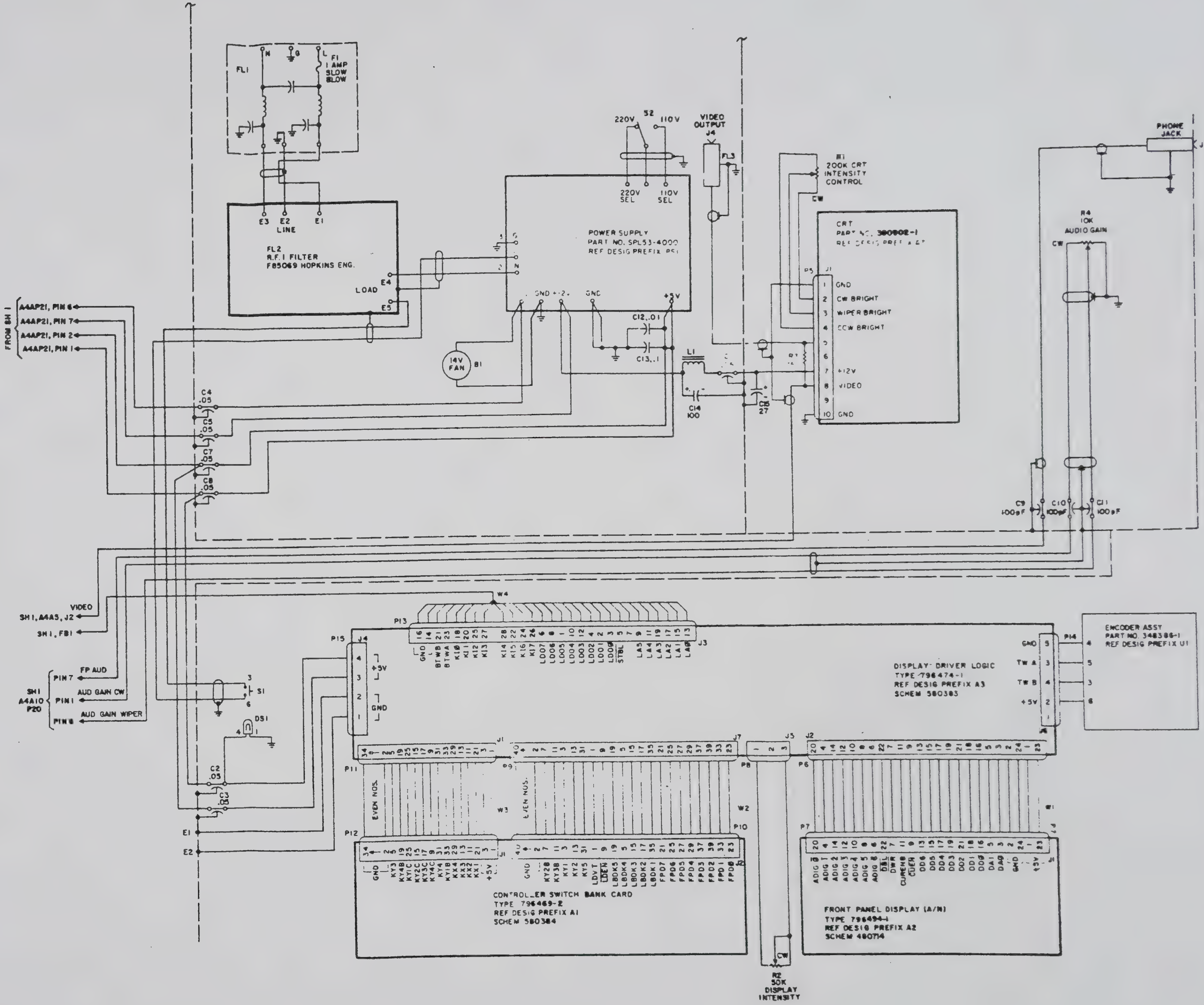
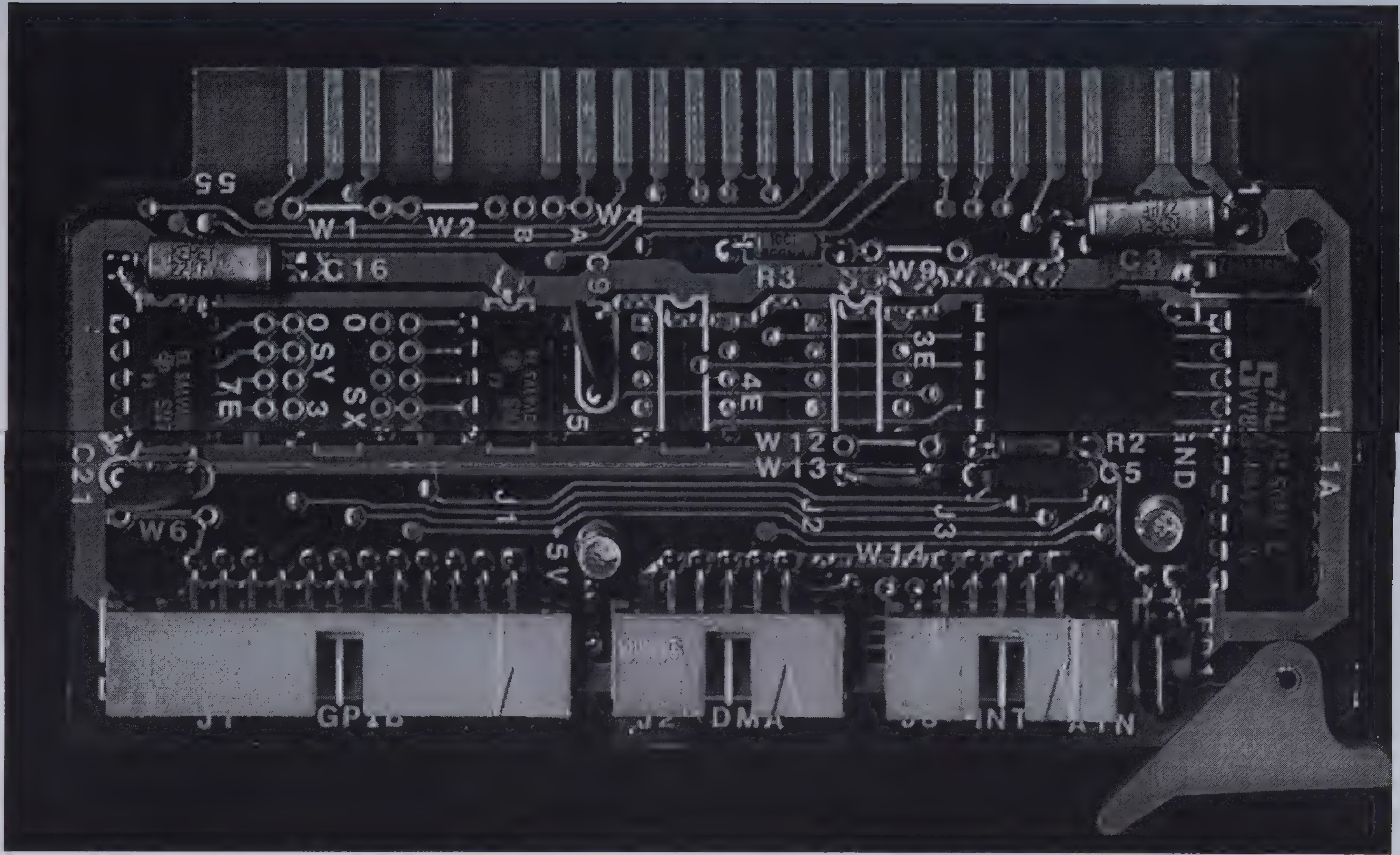
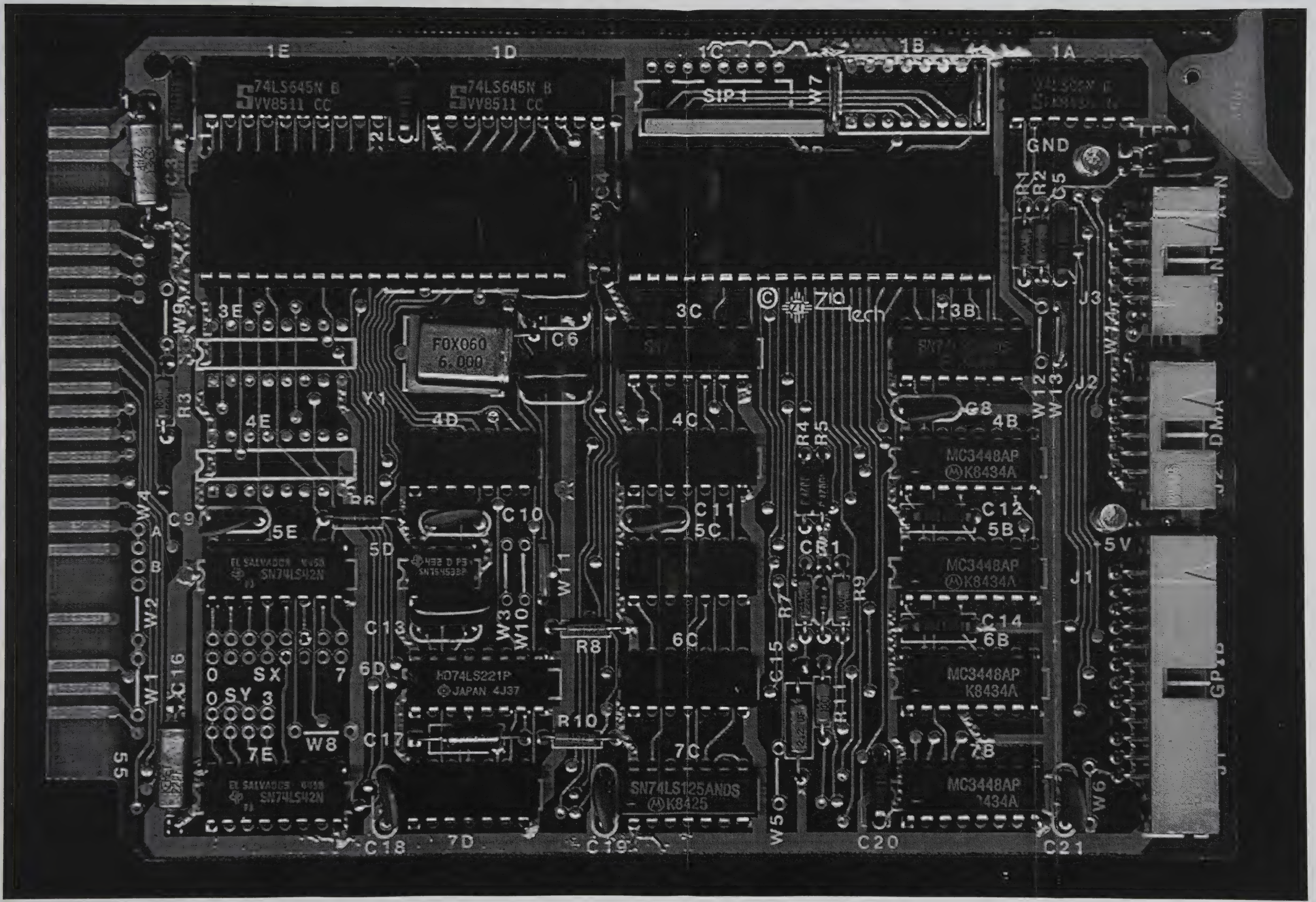

FL1
F1 1 AMP SLOW BLOW
FL2 R.F.I FILTER F85069 HOPKINS ENG.
LINE
LOAD
E1
E2
E3
E4
E5
S2
220V
110V
220V SEL
110V SEL
POWER SUPPLY PART NO. SPL53-4000 REF DESIG PREFIX PS1
GND
+5V
C12 .01
C13 .1
L1
C14 100
C15 27
14V FAN
B1
VIDEO OUTPUT
J4
FL3
R1 200K CRT INTENSITY CONTROL
CW
CRT PART NO. 380902-1
P3
J1
GND
CW BRIGHT
WIPER BRIGHT
CCW BRIGHT
+12V
VIDEO
GND
PHONE JACK
J7
R4 10K AUDIO GAIN
CW
C9 100pF
C10 100pF
C11 100pF
FROM SH 1
A4AP21, PIN 6
A4AP21, PIN 7
A4AP21, PIN 2
A4AP21, PIN 1
C4 .05
C5 .05
C7 .05
C8 .05
VIDEO
SH1, A4A5, J2
SH1, FB1
SH1 A4A10 P20
PIN 7
PIN 1
PIN 8
FP AUD
AUD GAIN CW
AUD GAIN WIPER
S1
DS1
C2 .05
C3 .05
E1
E2
W4
P13
J3
P15
J4
+5V
GND
DISPLAY DRIVER LOGIC TYPE 796474-1 REF DESIG PREFIX A3 SCHEM 580383
ENCODER ASSY PART NO. 348386-1 REF DESIG PREFIX U1
P14
GND
TW A
TW B
+5V
J1
J7
J5
J2
P11
P9
P8
P6
W3
W2
W1
P12
P10
P7
EVEN NOS.
CONTROLLER SWITCH BANK CARD TYPE 796469-2 REF DESIG PREFIX A1 SCHEM 580384
FRONT PANEL DISPLAY (A/N) TYPE 796494-1 REF DESIG PREFIX A2 SCHEM 480714
R2 50K DISPLAY INTENSITY
CW

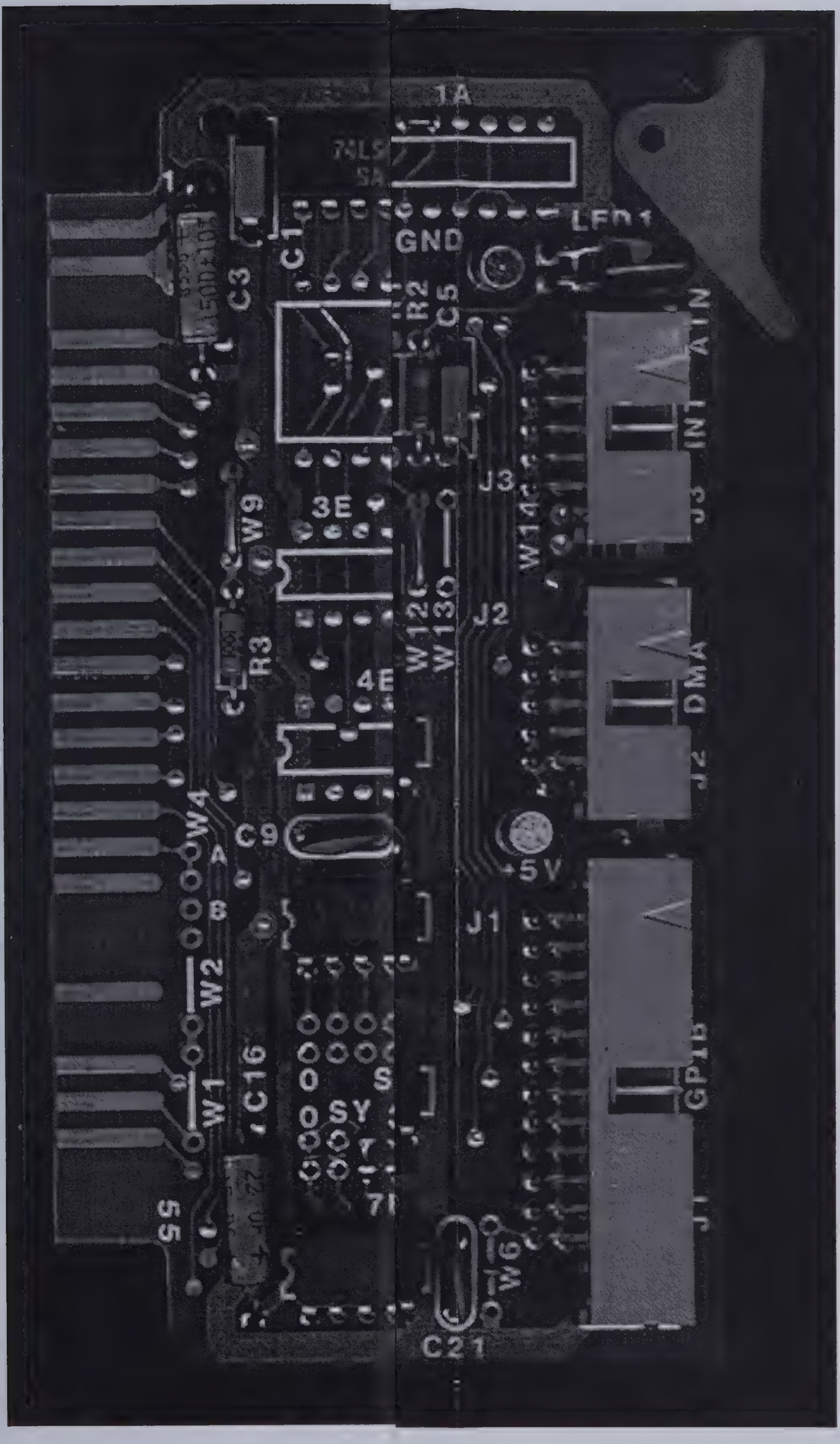
Figure 1-7. Type WJ-8610A-5, Controller Main Chassis Schematic Diagram 580665 (Sheet 3 of 3) (02)


55
W1
W2
B
A
W4
C16
C9
R3
W9
C3
1
SY
SX
7E
3E
4E
5
W12
W13
R2
C5
GND
1A
C21
W6
J1
5V
J2
J3
W14
J1
GP1B
J2
DMA
J3
INT
ATN

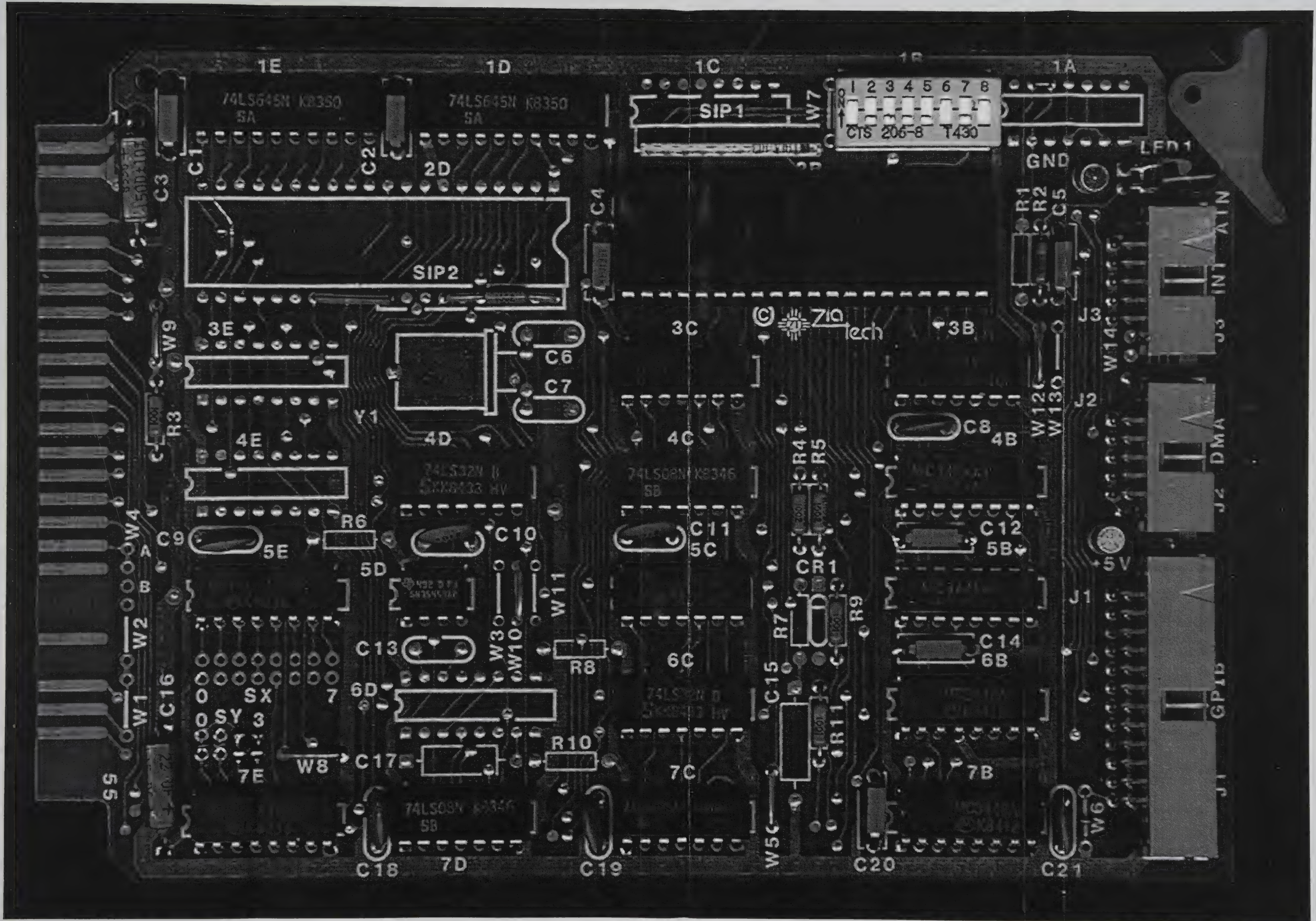
A4A3 RX BUS GPIB


1E
1D
1C
1B
1A
74LS645N B
VV8511 CC
74LS645N B
VV8511 CC
SIP1
W7
GND
LED1
R1
R2
C5
ATN
INT
J3
W14
3E
3C
3B
FOX060
6.000
C6
Y1
W9
R3
4E
4D
4C
4B
C8
W12
W13
J2
DMA
MC3448AP
K8434A
R4
R5
R6
C9
5E
5D
C10
C11
5C
C12
5B
5V
W4
A
B
W2
SN74LS42N
SN74S538P
W11
CR1
R7
R9
J1
W3
W10
C13
R8
6C
C14
6B
W1
C16
SX
SY
6D
HD74LS221P
JAPAN 4J37
C15
R11
GPIB
W8
C17
R10
7E
7C
7B
55
SN74LS42N
SN74LS125ANDS
K8425
W5
W6
C18
7D
C19
C20
C21

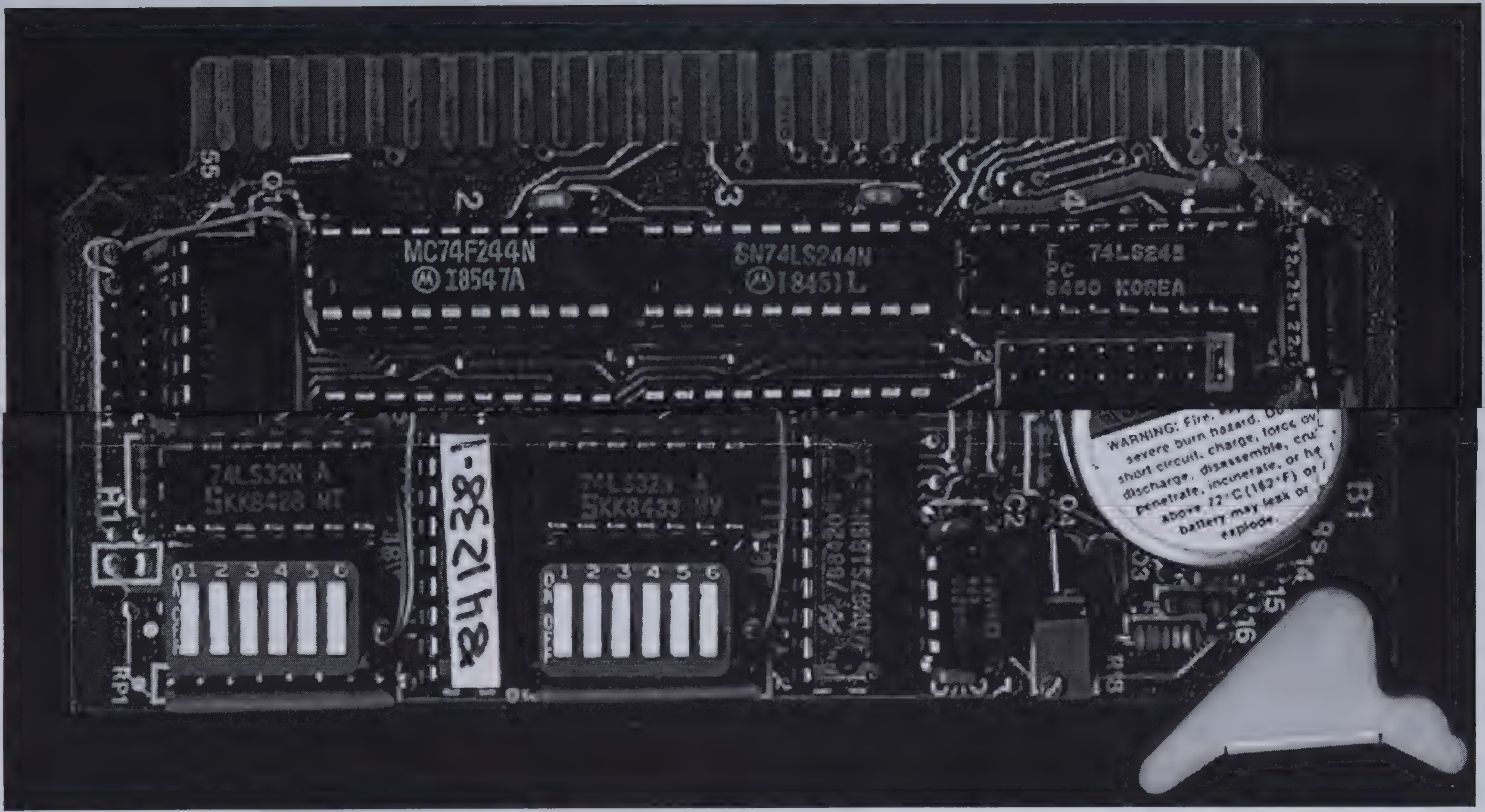
A4A3 RX BUS GPIB


1A
74LS
GND
LED1
C1
C3
R2
C5
AIN
IN1
J3
W14
3E
W9
W12
W13
J2
R3
4E
DMA
C9
W4
A
B
+5V
J1
W2
GPIB
C16
W1
SY
55
W6
C21

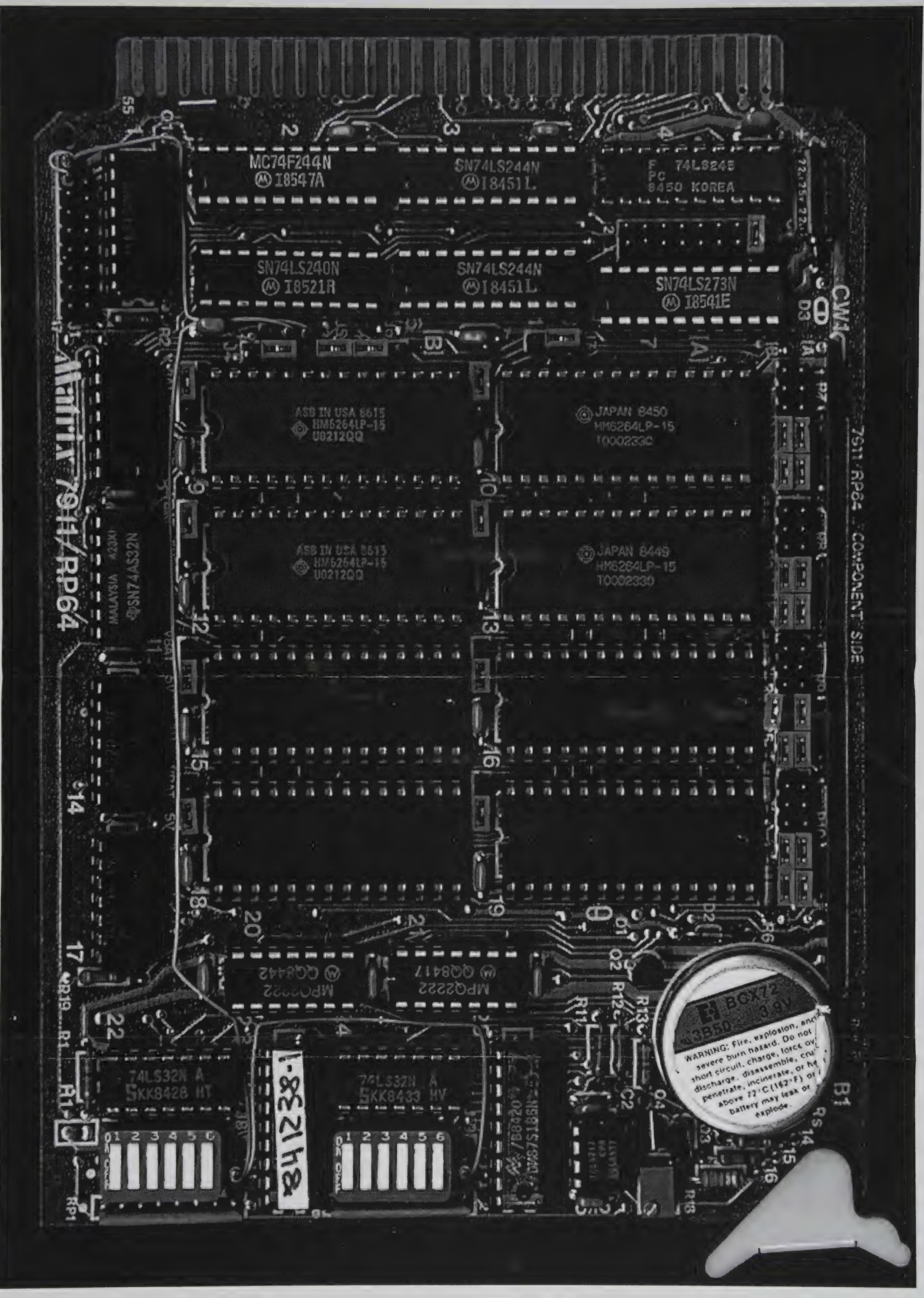
A4A4 CTLR GPIB


1E
1D
1C
1B
1A
74LS645N K8350 SA
SIP1
W7
CTS 206-8 T430
GND
LED1
C1
C2
C3
2D
C4
R1
R2
C5
SIP2
AIN
INT
J3
W14
3E
3C
Zia tech
3B
W9
C6
C7
Y1
W12
W13
J2
R3
4E
4D
4C
R4
R5
C8
4B
DMA
74LS32N
74LS08N K8346 SB
W4
C9
R6
5E
C10
C11
5C
C12
5B
5V
A
B
5D
W11
CR1
J1
W3
W10
R7
R9
W2
C13
R8
6C
C14
6B
C15
R11
W1
C16
0
SX
7
6D
0
SY
3
GPIB
W8
C17
R10
7E
7C
7B
55
W5
W6
C18
7D
C19
C20
C21

A4A4 CTLR GPIB

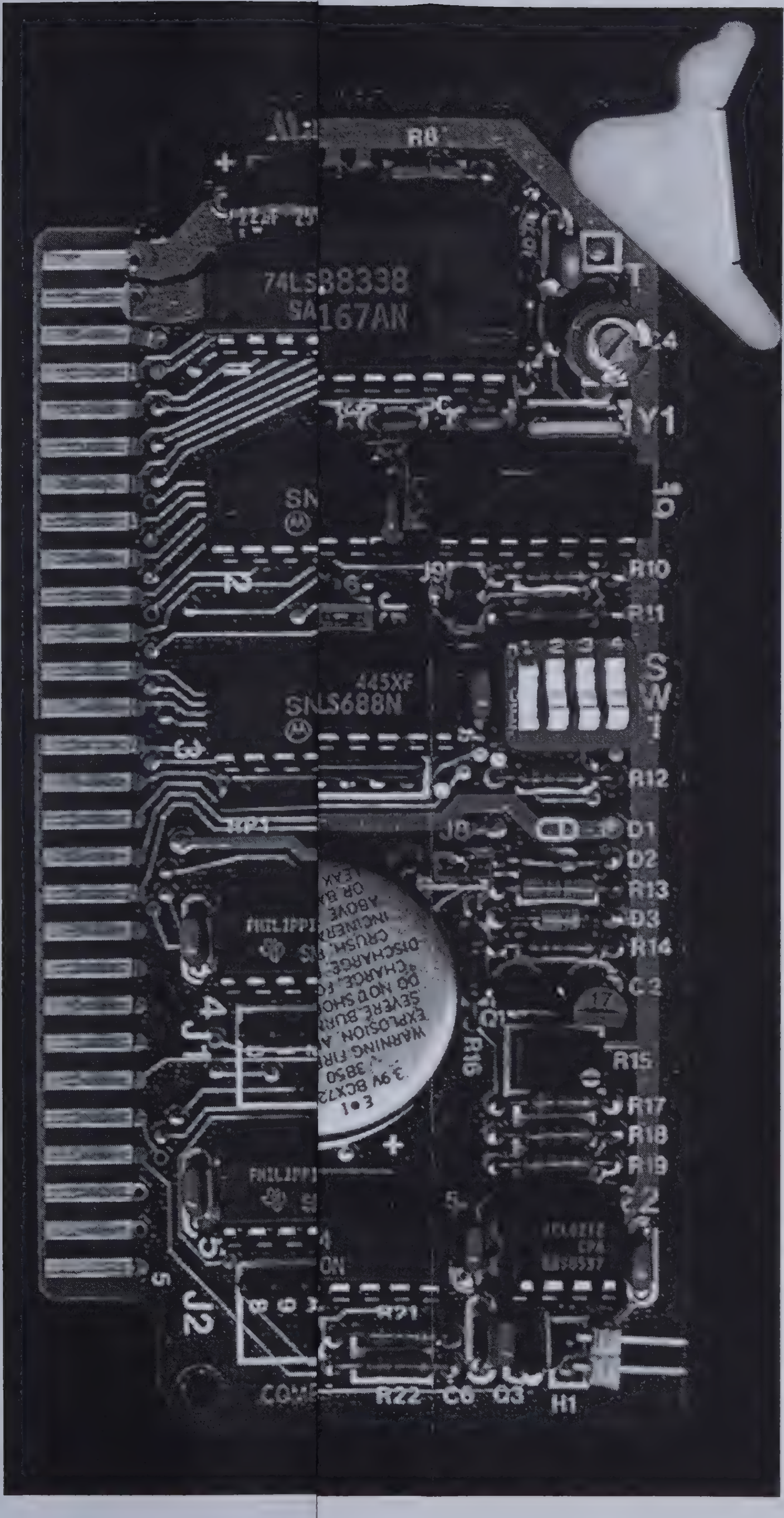

MC74F244N
Ⓜ I8547A
SN74LS244N
Ⓜ I8451L
F 74LS245
PC
8450 KOREA
74LS32N A
SKK8428 NT
74LS32N A
SKK8433 HV
841238-1
WARNING: Fire, explosion and severe burn hazard. Do not short circuit, charge, force over discharge, disassemble, crush, penetrate, incinerate, or heat above 72°C (162°F) or battery may leak or explode.
B1
55
2
3
4
R1
RP1
C2
Q4
R18
14
15
16

A4A6
[illegible] [illegible] 16K RAM

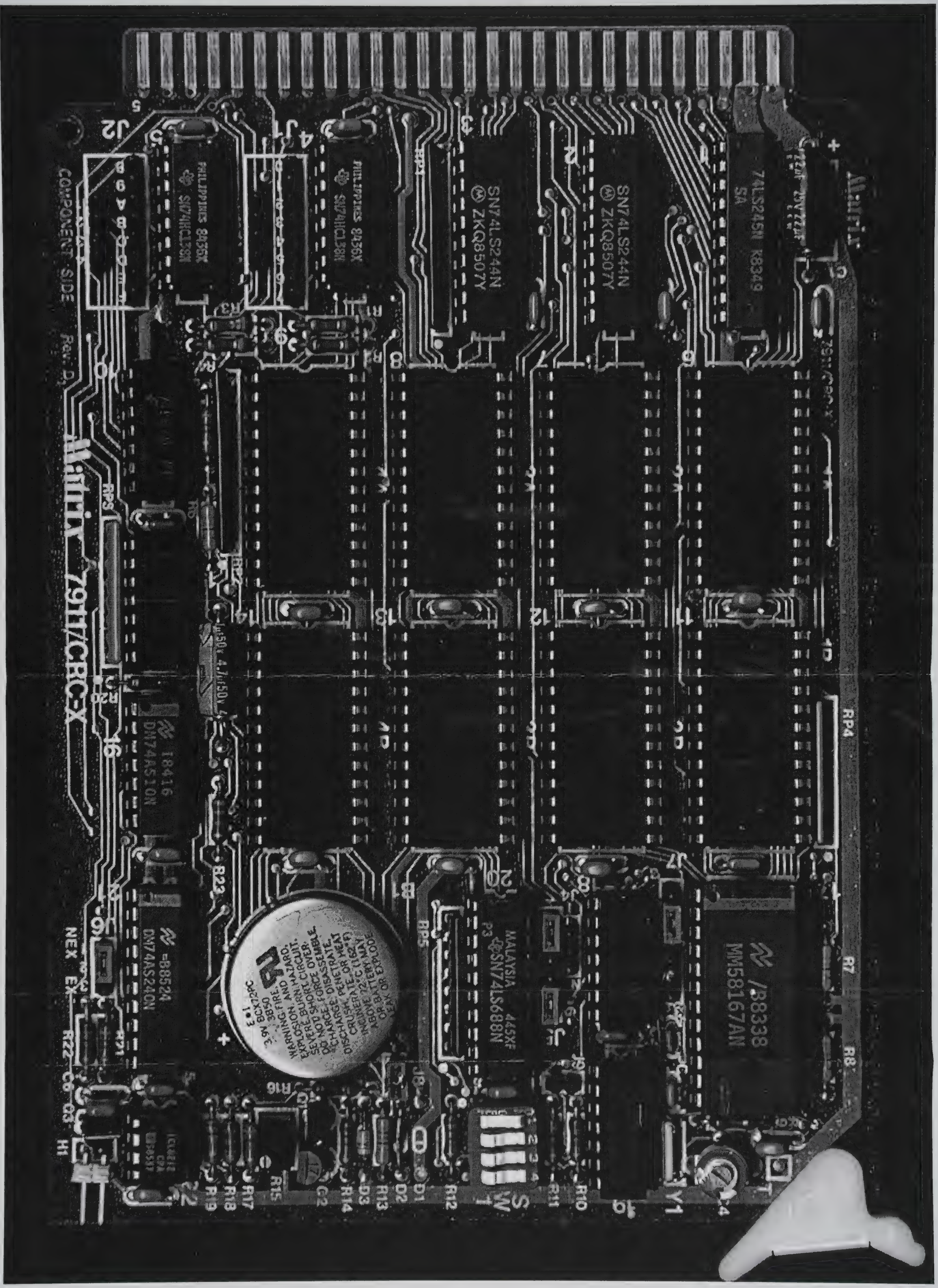

7911 RP64 COMPONENT SIDE
Matrix 7911/RP64
MC74F244N
SN74LS244N
F 74LS245
8450 KOREA
SN74LS240N
SN74LS273N
JAPAN 8450 HM6264LP-15
JAPAN 8449 HM6264LP-15
ASB IN USA 8615 HM6264LP-15
MPQ2222
74LS32N A
SN74AS32N
BCX72 3.9V
WARNING: Fire, explosion, and severe burn hazard. Do not short circuit, charge, force over discharge, disassemble, crush, penetrate, incinerate, or heat above 72°C (162°F) or battery may leak or explode.
841238-1
CW1
B1

A4A6

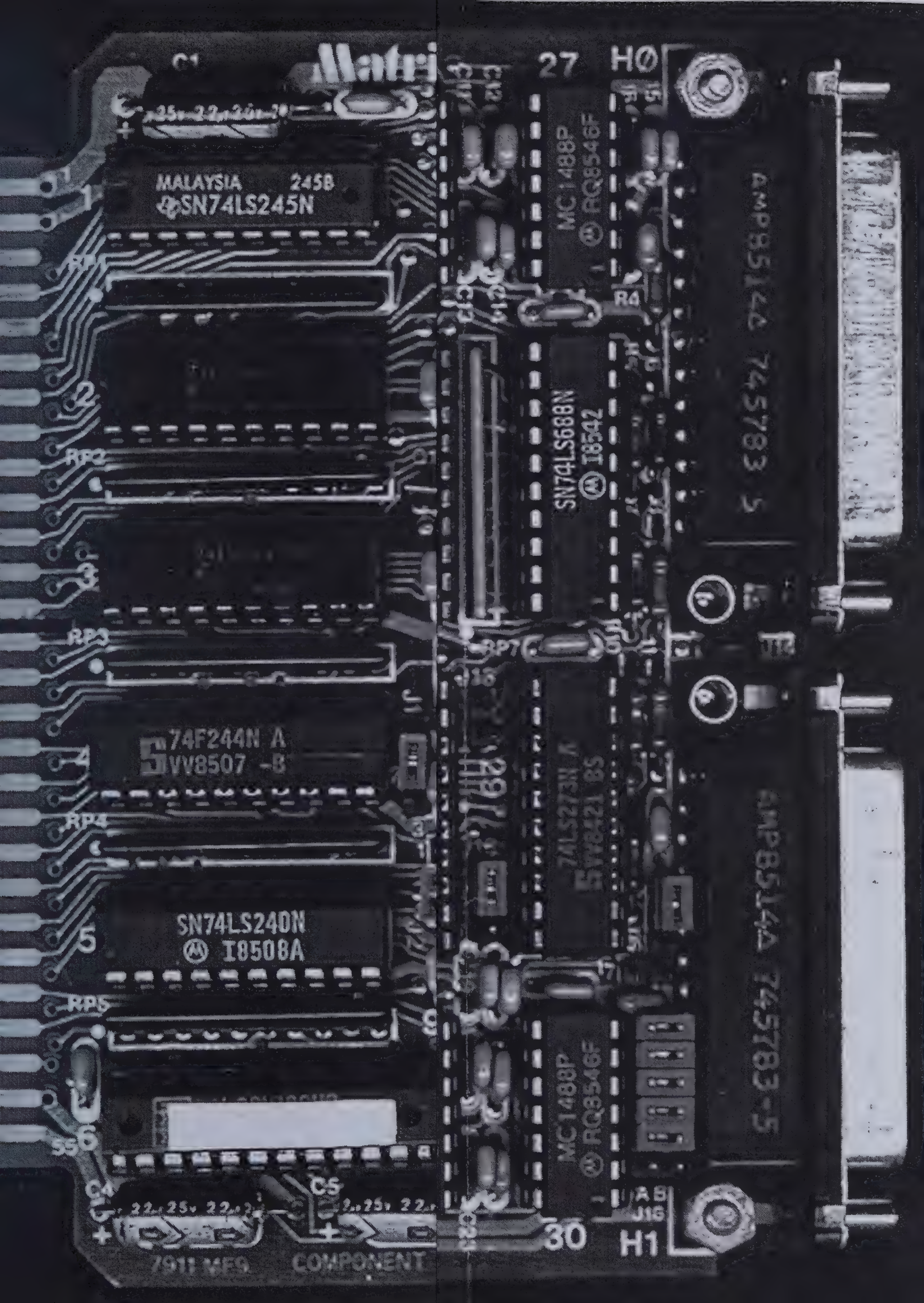
16K RAM

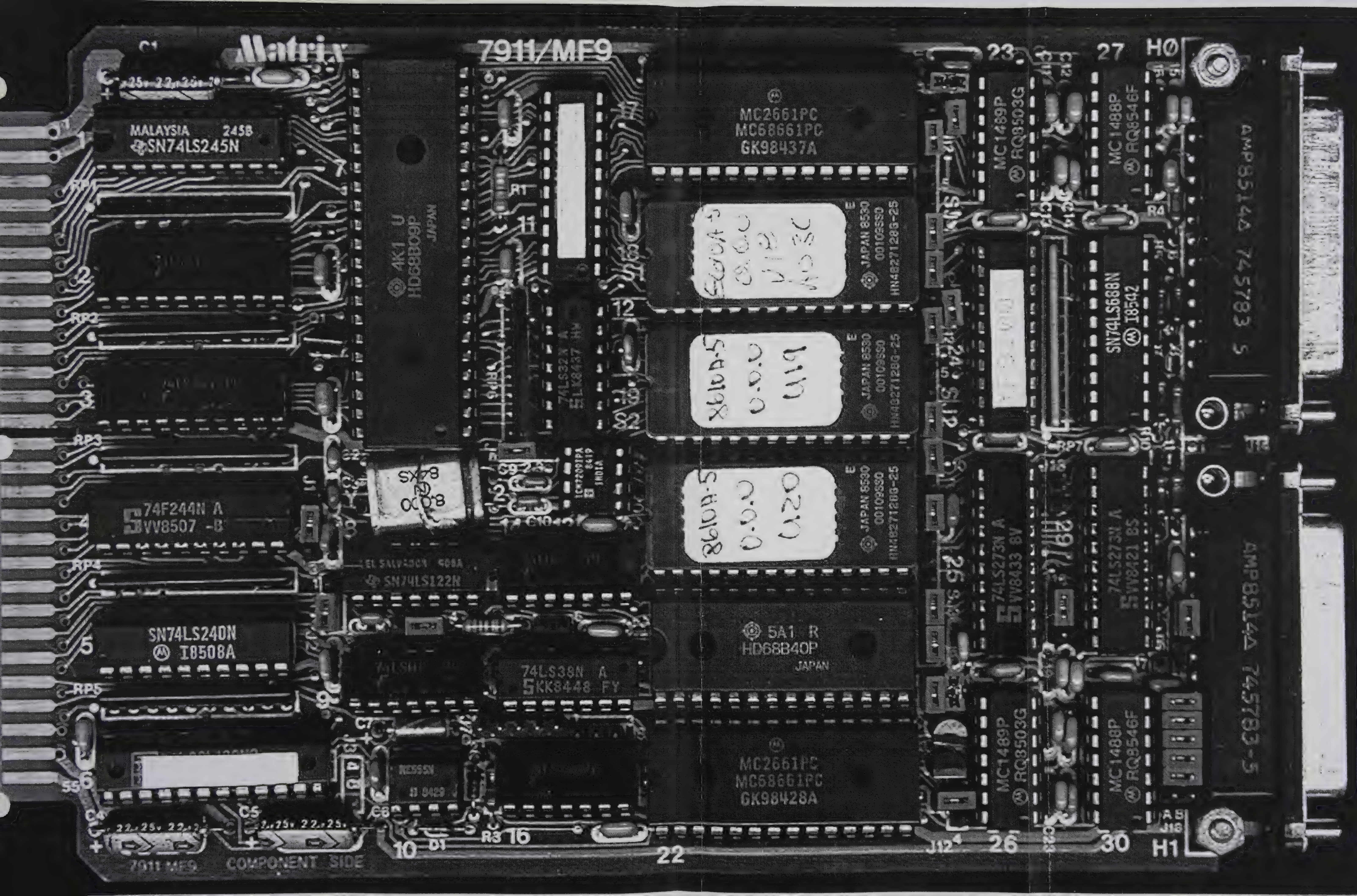

R8
74LS88338
SA167AN
Y1
SN
R10
R11
SW1
445XF
SNLS688N
R12
J8
D1
D2
R13
D3
R14
C2
R15
R16
WARNING
3.9V BCX72
R17
R18
R19
J1
J2
R21
R22
C6
Q3
H1
COMS

A447 CDC-X RTC


Matrix
7911/CRC-X
Matrix 7911/CRC-X
COMPONENT SIDE
Rev. D
74LS245N K8349
SA
SN74LS244N
ZKQ8507Y
SN74LS244N
ZKQ8507Y
PHILIPPINES 8436X
SN74HC138N
PHILIPPINES 8436X
SN74HC138N
/B8338
MM58167AN
MALAYSIA 445XF
SN74LS688N
18416
DM74AS10N
=B8524
DM74AS240N
3.9V BCX72PC
WARNING: FIRE, EXPLOSION, AND BURN HAZARD. SEVERE BURN HAZARD. DO NOT SHORT CIRCUIT, FORCE OVER-CHARGE, DISASSEMBLE, DISCHARGE, PENETRATE, CRUSH, INCINERATE, OR HEAT ABOVE 212°C (100°F) OR BATTERY MAY LEAK OR EXPLODE
RP1
RP2
RP4
RP5
R7
R8
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R21
R22
R23
D1
D2
D3
C2
C6
Q3
H1
Y1
SW1
J1
J2
NEX
EX

A4A7 CRC-X RTC


Matri
C1
27
H0
MALAYSIA 245B
SN74LS245N
1
RP1
2
RP2
3
RP3
74F244N A
VV8507 -B
4
RP4
SN74LS240N
I8508A
5
RP5
SS6
C4
C5
7911 MFG
COMPONENT
MC1488P
RQ8546F
R4
SN74LS688N
I8542
RP7
74LS273N A
17
MC1488P
RQ8546F
A B
J16
30
H1
AMP8514A 745783-5


Matrix
7911/MF9
MALAYSIA 245B
SN74LS245N
4K1 U
HD68B09P
JAPAN
74LS32N A
MC2661PC
MC68661PC
GK98437A
MC1489P
RQ8503G
MC1488P
RQ8546F
AMP85144 745783-5
JAPAN 8530
HN482712BG-25
SN74LS688N
I8542
74F244N A
VV8507 -B
EL SALVADOR 408A
SN74LS122N
SN74LS240N
I8508A
5A1 R
HD68B40P
JAPAN
74LS38N A
KK8448 FY
74LS273N A
VV8433 8V
74LS273N A
VV8421 8S
MC2661PC
MC68661PC
GK98428A
NE555N
7911 MF9
COMPONENT SIDE
H0
H1
J18
RP1
RP2
RP3
RP4
RP5
RP7
R1
R3
R4
C1
C4
C5
C6
C7
D1
J12
1
2
3
4
5
6
7
9
10
11
12
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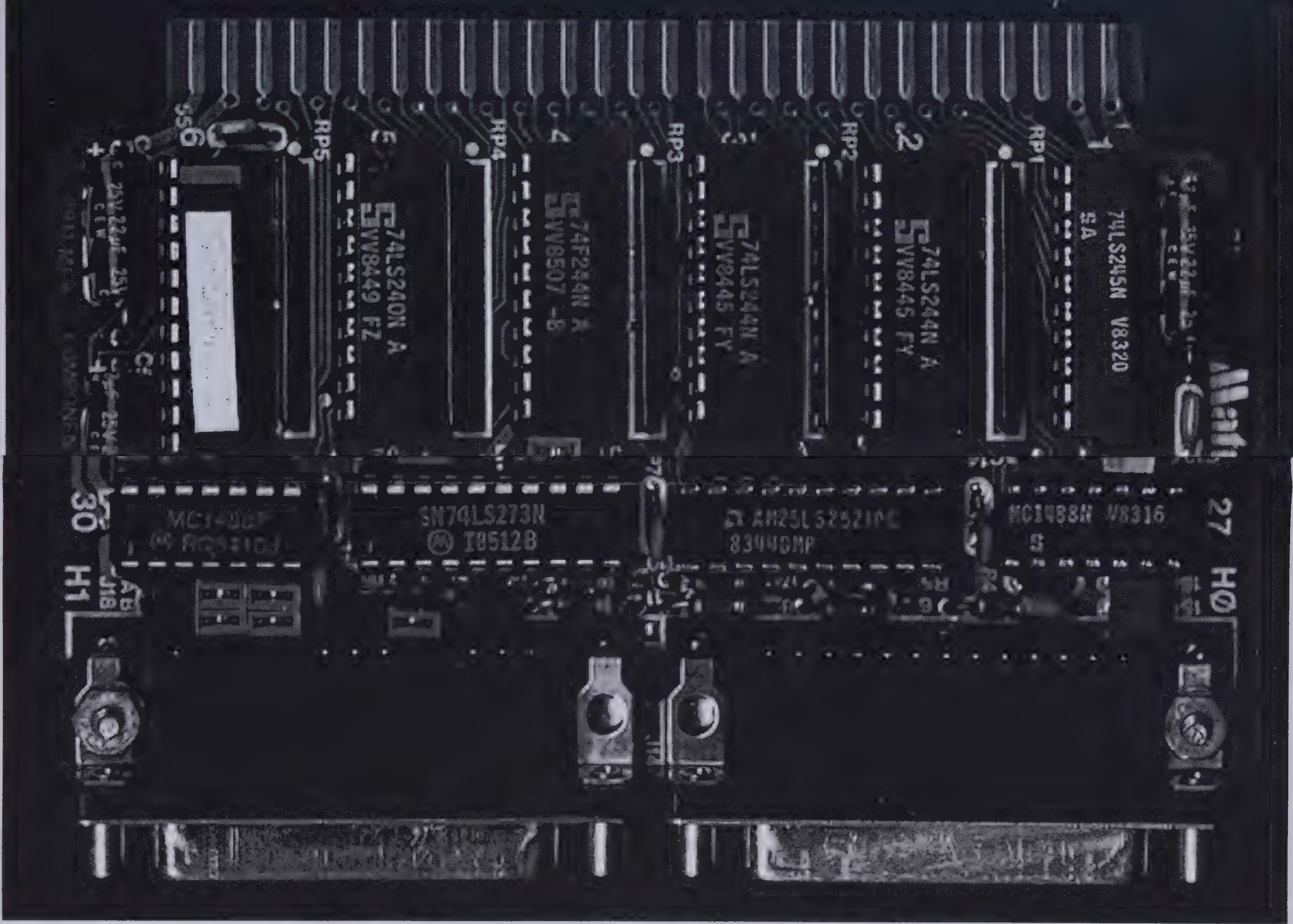
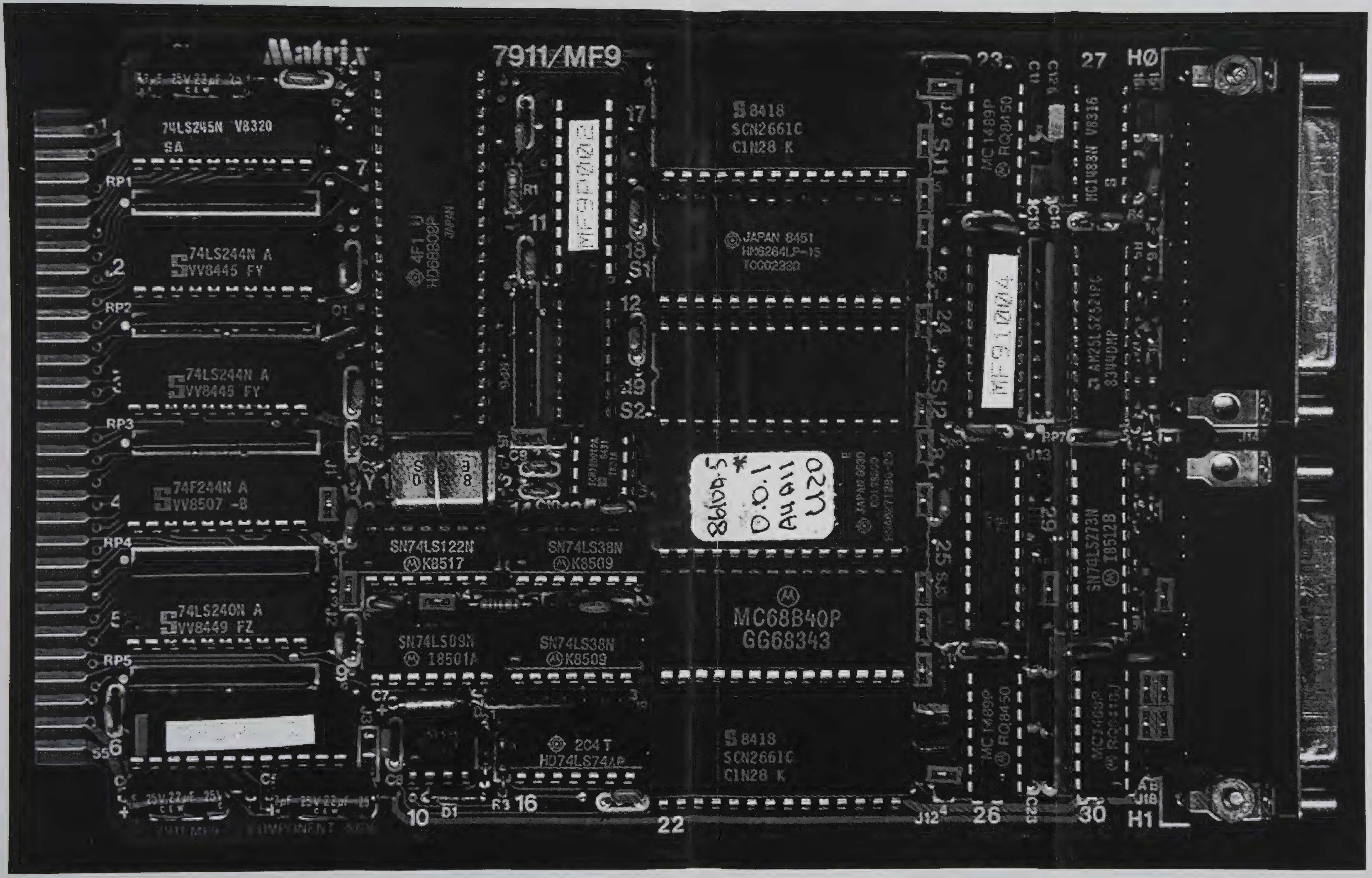
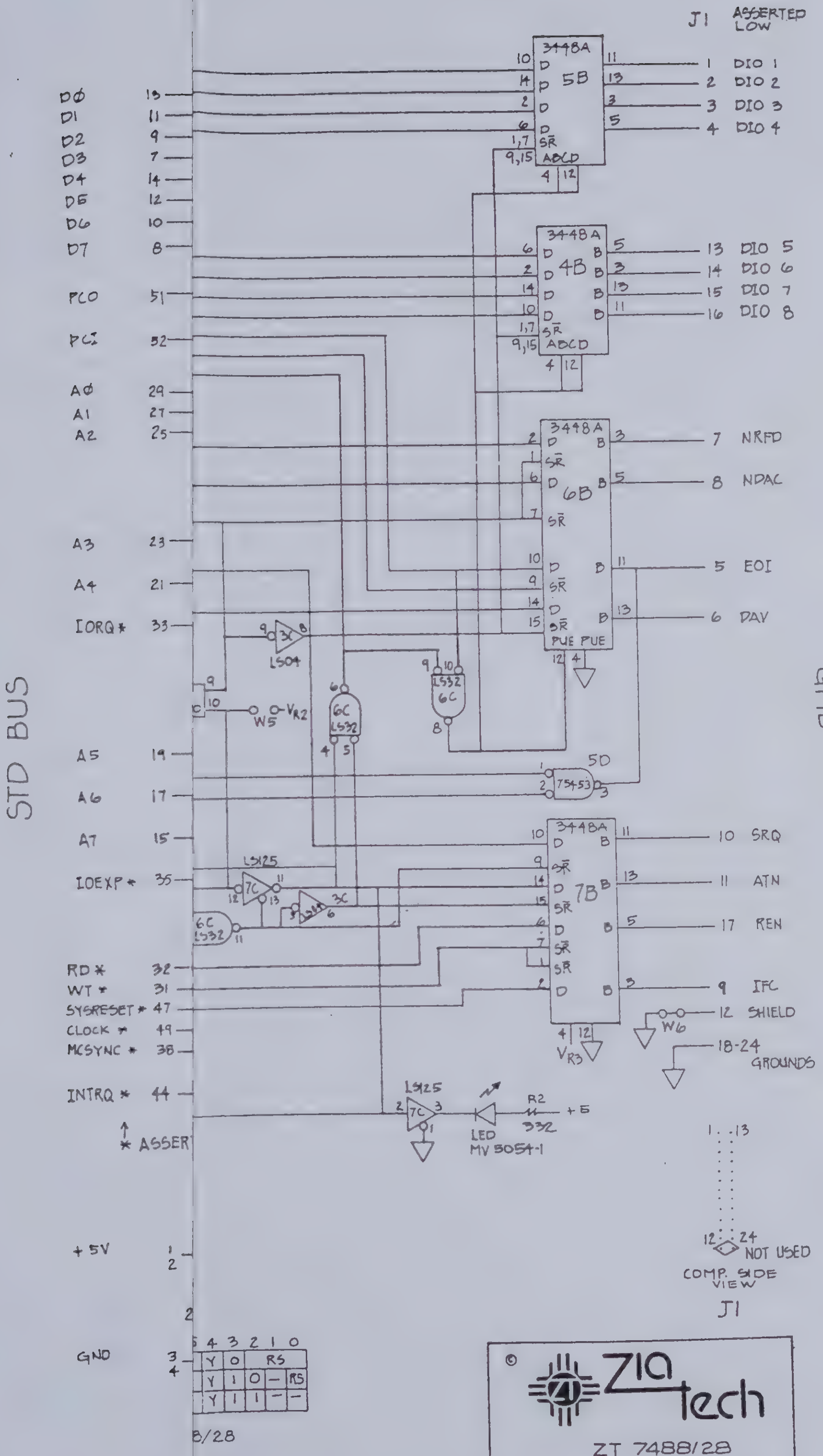
17
18
19
22
23
24
25
26
27
29
30


74LS245N V8320
SA
74LS244N A
VV8445 FY
74LS244N A
VV8445 FY
74F244N A
VV8507 -B
74LS240N A
VV8449 FZ
RP1
RP2
RP3
RP4
RP5
MC1488N V8316
AM25LS2521PC
8344DMP
SN74LS273N
I85128
27
30
H0
H1
J18

A4A11 AUX CPU


Matrix
7911/MF9
74LS245N V8320
74LS244N A
VV8445 FY
74LS244N A
VV8445 FY
74F244N A
VV8507 -B
74LS240N A
VV8449 FZ
RP1
RP2
RP3
RP4
RP5
HD68B09P
MF9P002
SN74LS122N
K8517
SN74LS38N
K8509
SN74LS09N
I8501A
SN74LS38N
K8509
HD74LS74AP
8418
SCN2661C
C1N28 K
JAPAN 8451
HM6264LP-15
MC68B40P
GG68343
8418
SCN2661C
C1N28 K
86100-5 *
0.0.1
A4A11
U20
MF9L004
MC1489P
RQ8450
MC1488N V8316
AM25LS2521PC
SN74LS273N
I8512B
MC1489P
RQ8450
H0
H1
23
27
26
30
22
16
10

A4A11 AUX CPU


J1
ASSERTED LOW
3448A
5B
4B
6B
7B
D
B
SR̄
ABCD
PUE PUE
1 DIO 1
2 DIO 2
3 DIO 3
4 DIO 4
13 DIO 5
14 DIO 6
15 DIO 7
16 DIO 8
7 NRFD
8 NDAC
5 EOI
6 DAV
10 SRQ
11 ATN
17 REN
9 IFC
12 SHIELD
W6
18-24 GROUNDS
GPIB
STD BUS
DØ 13
D1 11
D2 9
D3 7
D4 14
D5 12
D6 10
D7 8
PC0 51
PC1 52
AØ 29
A1 27
A2 25
A3 23
A4 21
IORQ * 33
A5 19
A6 17
A7 15
IOEXP * 35
RD * 32
WT * 31
SYSRESET * 47
CLOCK * 49
MCSYNC * 38
INTRQ * 44
* ASSER
+5V 1 2
GND 3 4
3C
LS04
6C
LS32
W5
V_{R2}
5D
75453
LS125
7C
V_{R3}
LED
MV 5054-1
R2
332
+5
1 . . 13
12 24
NOT USED
COMP. SIDE VIEW
J1
5 4 3 2 1 0
Y O RS
Y 1 O — RS
Y 1 1 — —
8/28

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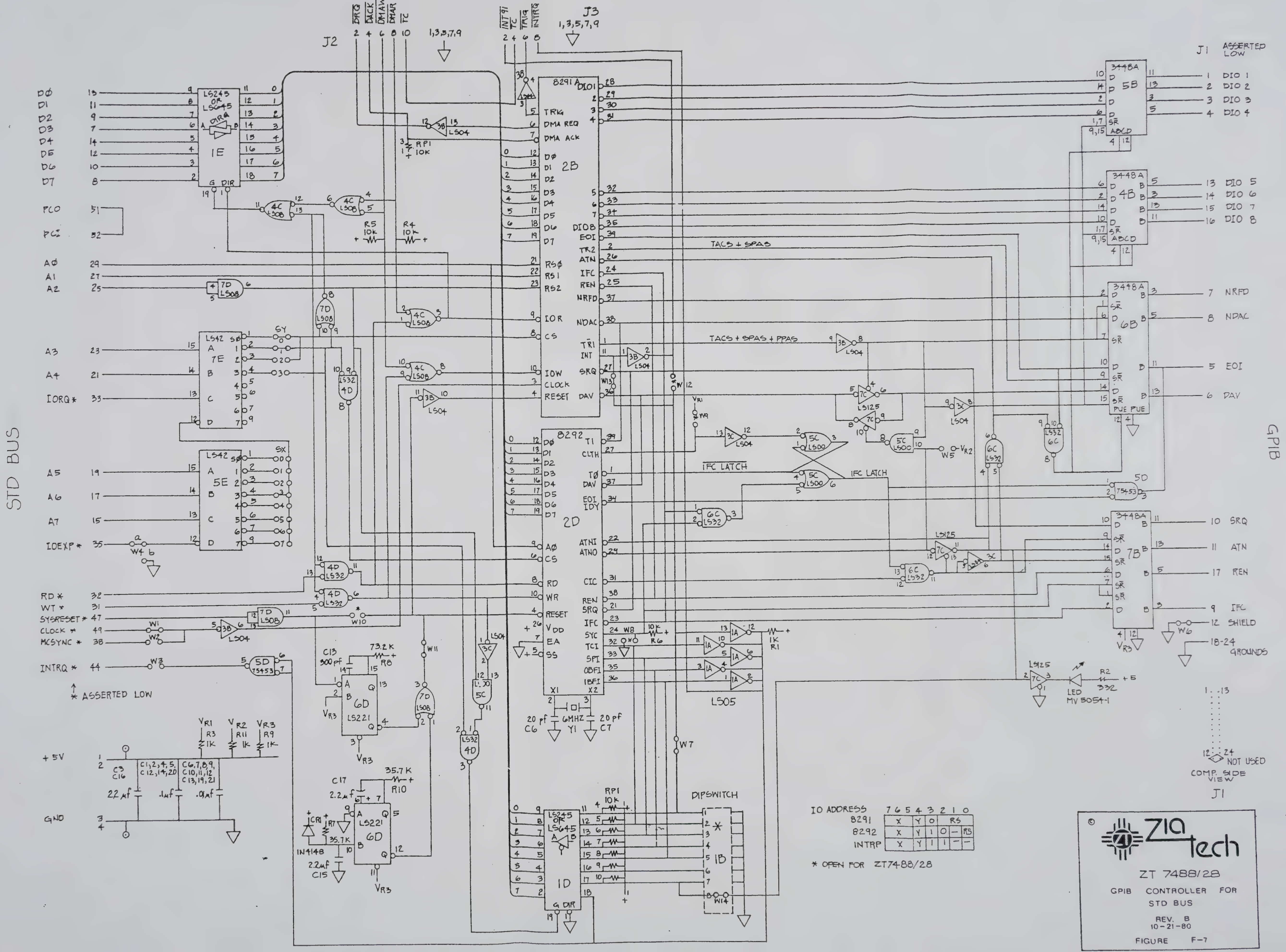
Zia tech

ZT 7488/28

GPIB CONTROLLER FOR STD BUS

REV. B
10-21-80

FIGURE F-7


STD BUS
GPIB
J1
J2
J3
8291A
2B
8292
2D
LS245 OR LS645
1E
1D
LS42
7E
5E
3448A
5B
4B
6B
7B
LS221
6D
DIPSWITCH
1B
TACS + SPAS
TACS + SPAS + PPAS
IFC LATCH
ASSERTED LOW
* ASSERTED LOW
6MHZ
Y1
LED MV 5054-1
IN4148
+5V
GND
NOT USED
COMP. SIDE VIEW

IO ADDRESS	7 6 5	4	3	2	1	0
8291	X	Y	0	RS		
8292	X	Y	1	0	—	RS
INTRP	X	Y	1	1	—	—

* OPEN FOR ZT7488/28

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ZT 7488/28

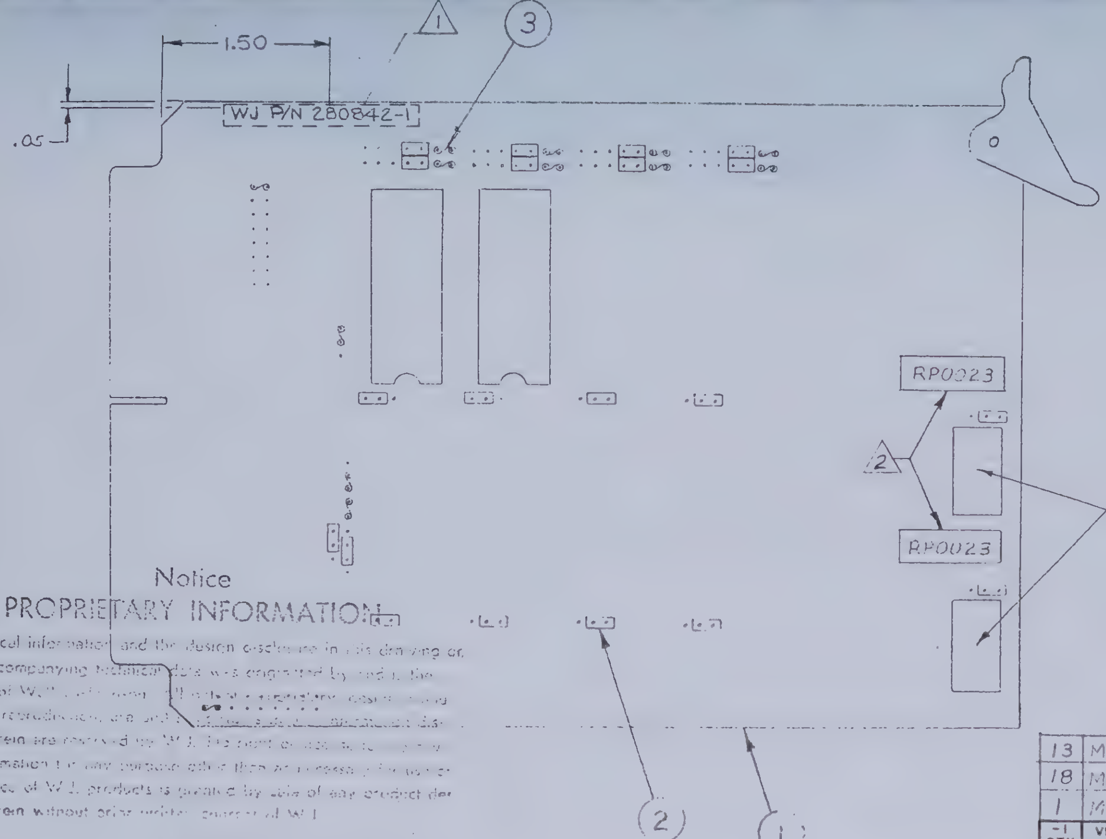
GPIB CONTROLLER FOR STD BUS

REV. B
10-21-80

FIGURE F-7

REVISIONS

LTR	DESCRIPTION	DATE	APPROVED
01	PRE-PRODUCTION RELEASE	6-20-84	H. CATHEY
A	RELEASED FOR PRODUCTION	7-2-85	H. CATHEY
B	INC ECN 23482	8-14-85	MWM
C	INC ECN 25628 AND 11988	11-9-88	



NOTE:

1. MARK WJ PART NUMBER FARSIDE IN .09 HIGH WHITE CHARACTERS USING PERMANENT, NON CONDUCTIVE INK.
2. DECODER PROM IS EITHER P/N RP1001 OR P/NRP0023

Notice
PROPRIETARY INFORMATION
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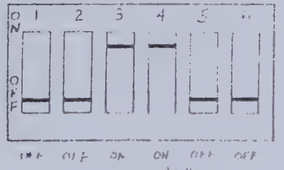


DETAIL "A"
SWITCH POSITIONS

ALTERED ITEM DRAWING

-1 QTY REQD	VENDOR OR CODE IDENT	PART NO. OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTE	ITEM/FIND NO.
13	MATRIX		WIRE WRAP		3
18	MATRIX		JUMPER PLUG		2
1	MATRIX	7911/RP64	16K RAM		1

PARTS LIST

NEXT ASSY	USED ON
	WJ-8610

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ~
2 PLACE DECIMALS ± .05
3 PLACE DECIMALS ± ~
ANGLES ± ~

MATERIAL ———

FINISH ———

CONTRACT NO.

DATE

PREPARED	H CATHEY	6-19-84
CHECKED	MWM	3-15-85
ENGINEER	H. CATHEY	7-2-85

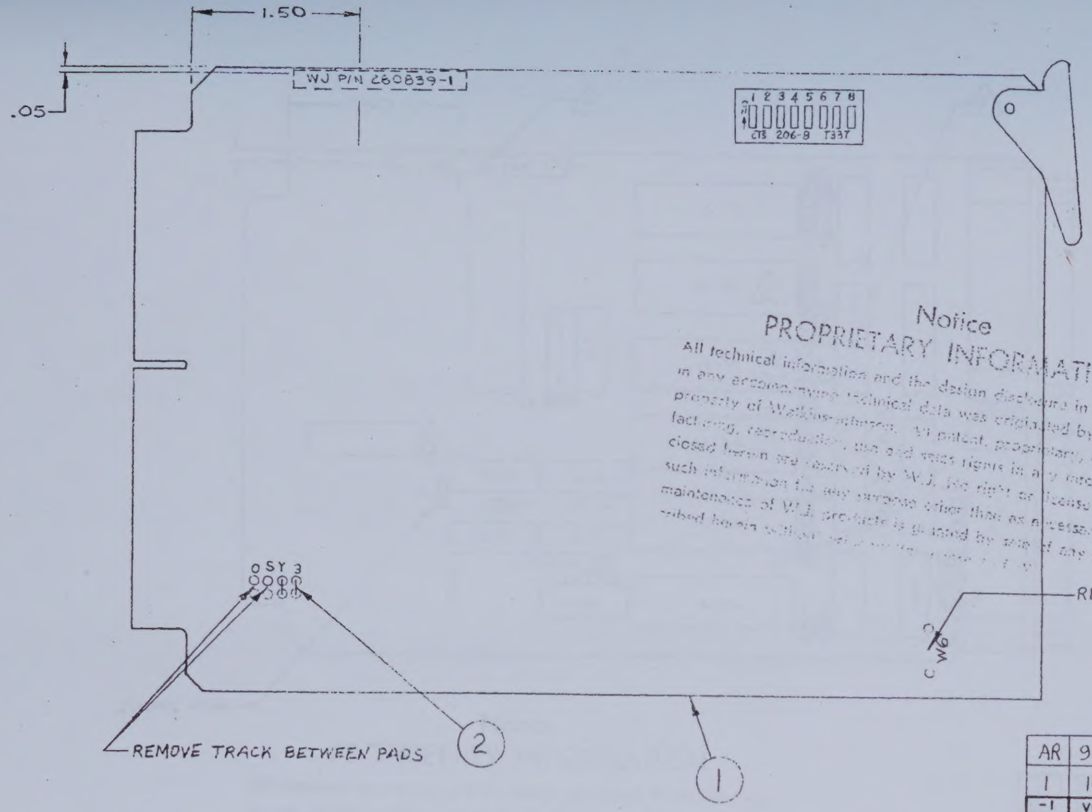
WJ WATKINS-JOHNSON
GAITHERSBURG MARYLAND USA

7911/RP64 16K RAM

SIZE	CODE IDENT NO.	DRAWING NO.	
B	14632	280842	C.
SCALE NONE		SHEET 1 OF 1.	REV

REFERENCE PRINT

LTR	DESCRIPTION	DATE	APPROVED
REVISIONS			
01	PRE-PRODUCTION RELEASE	6-19-84	H. CATHEY
A	RELEASED FOR PRODUCTION	7-2-85	H. CATHEY
B	INC ECN 23482 J.K.	8-9-85	MWM



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NOTE: △1 MARK WJ PART NUMBER FARSIDE IN .09 HIGH WHITE CHARACTERS USING PERMANENT, NON CONDUCTIVE INK.

ALTERED ITEM DRAWING

-1 QTY REQD	VENDOR OR CODE IDENT	PART NO. OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NOTE	ITEM FIND NO.
AR	90484	24AWG	JUMPER WIRE		2
1	14632	ZT7488/08	IEEE 488 INTERFACE		1

PARTS LIST

	WJ-8610
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±~
2 PLACE DECIMALS ± .05
3 PLACE DECIMALS ±~
ANGLES ±~
MATERIAL ______
FINISH ______

CONTRACT NO.
DATE ______

PREPARED	H. CATHEY	6-19-84
CHECKED	MWM	3-15-85
ENGINEER	H. CATHEY	7-2-85

WJ WATKINS-JOHNSON
GAITHERSBURG, MARYLAND USA

ZT 7488/08
IEEE 488 INTERFACE

SIZE	CODE IDENT NO.	DRAWING NO.	
B	14632	280839	B
SCALE NONE		SHEET 1 OF 1	REV

REFERENCE PRINT